

FLIGHT

The
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&
AIRSHIPS

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"FLIGHT" PHOTOGRAPHS.

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For Sizes and Prices see Advert. page xxxvi.

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

- 1927
- Mar. 16 Inst. Ae.E. Visit to the Factory of A.D.C. Aircraft, Ltd., Waddon.
- Mar. 17 "Line Squalls." Mr. M. A. Giblett, M.Sc., before R.Ae.S.
- Mar. 17 Aero. Golfing Soc. (Sir S. Instone Cup), Sunningdale.
- Mar. 22 "Aircraft Law." Mr. Lawrence A. Wingfield before Inst.Ae.E.
- Mar. 26 R.A.F. India Reunion Dinner, New Princes Restaurant.
- Mar. 26 R.A.F. v. Army Rugby Match, Twickenham.
- Mar. 29 R.Ae.C. Annual General Meeting
- Mar. 31 "Recent Model Experiments in Aerodynamics." Mr. E. G. Richardson, before R.Ae.S.
- April — International Aero Exhibition, Copenhagen.

INDEX FOR VOL. XVIII.

The Index for Vol. xviii of "Flight" (January to December, 1926) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C.2. Price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT.



The Air Estimates

NET decrease of £450,000 as compared with last year's figures is contemplated in the Air Estimates for 1927, which have just been published, and a summary of which will be found elsewhere in this issue of FLIGHT. There is a general strike, a coal strike, and various other items to be paid for, and, therefore, more economy no doubt has been the watchword. On the other hand, no one seriously denies, in these "enlightened" days, that the relative importance of our three fighting services is gradually changing, the Royal Air Force being markedly in the ascendant. That being so, it might have been expected that, if the expansion programme promised some years ago cannot be carried out at the moment, at least there would have been no question of "cuts."

In his Memorandum accompanying the Air Estimates, the Secretary of State for Air, Sir Samuel Hoare, explains that there is a reduction of no less than £680,000 in air expenditure in the Middle East, due to the decrease of the Imperial forces in Iraq, which has been rendered possible by the continued success of the Air Command. Thus, this one item alone accounts for more than the total saving.

The Vote in which we are particularly interested is No. 3, "Technical and Warlike Stores," under sub-head A of which are set out the expenditures on the purchase of aircraft, engines, and spares. The gross figure for this particular item is £5,904,000, as compared with £5,351,000 last year, a difference of £553,000, which appears a most welcome and

appropriate increase, but is somewhat less encouraging when examined in more detail.

In his Memorandum Sir Samuel Hoare points out that the increase on the total of the sub-heads of this Vote is partly accounted for by increased requirements for airships and for research and technical development, but mainly by the increased provision necessary for the replacement of older types of aircraft and engines, and for the formation of new squadrons.

Sub-head A of Vote 3 shows that for complete machines the sum of £2,930,000 has been set aside. This compares with £2,888,000 last year, so that an increase of £42,000 is contemplated. In view of the fact that more squadrons are to be established, and war-time types of machines to be replaced entirely by modern ones, this increase is a very modest item in all conscience, and would only buy something like seven or eight average-size aeroplanes, according to type. In the case of complete engines the figure is £1,574,000, as compared with £1,031,000 last year. In view of the fact that it costs a great deal more to produce new types of engines than new types of aircraft, this increase, substantial as it is, cannot be regarded otherwise than as a just reward in the form of orders to the four engine firms whose task it has been to see to it that Great Britain keeps to the front in the matter of aero engines.

As distinct from the increases in the sums for machines and engines, there is a slight decrease in those set aside for machine and engine spares, amounting to £13,000 in the case of the former and £19,000 in the case of the latter. The statement by Sir Samuel Hoare that in future no more aircraft and engines of war-time designs are to be bought will be received with satisfaction. We have carried on far too long with "re-conditioned" flying stock, and it is only fair to the splendid personnel of the R.A.F. that it should be mounted on the best machines which modern science can provide.

The section of Sir Samuel Hoare's Memorandum which deals with Research and Technical Development should be read carefully. We cannot here enter into detailed comment on this, but it is satisfactory to be told that the increase is due, on the aeroplane side to provision for the purchase of a larger number of types that have already been flown experimentally, and on the engine side for the purchase of engines in an advanced stage of development. It will be recollected that nearly two years ago it was announced that all-metal construction would have to become general, and that a period of grace, as it were, of about two years would be allowed constructors. Doubtless it is in conformity with this policy that one finds the statement that the increase under sub-head G.1 of Vote 3 is mainly in respect of metal construction.

Significant is also the sentence which states: "The programme for the construction of new experimental aircraft provides for putting in hand eleven types." Among these mention is made of three "Autogyros." On the subject of the new "high-speed" programme, the Secretary of State for Air states that provision has been made in the Estimates for three more aircraft of the high-speed type. This is presumably the ministerial way of saying that three more Schneider Trophy machines will be ordered in addition to those known to be already nearing completion. If Great Britain is to have any spare machines at all for the race, this is, of course, a very necessary step.

The Vote for Civil Aviation (No. 8) varies but little in amount, but as pointed out by Sir Samuel Hoare in his memorandum, its character is materially changed, so that while the sums devoted to aerodromes and buildings are decreased, the amounts to be voted for subsidies have increased. This is due, in the main, to the subsidy granted to Imperial Airways for the operation of the Kairo-Basrah, and later the Basrah-Karachi route. It should be noted that in his memorandum Sir Samuel refers in somewhat guarded terms to the light aeroplane clubs, whose good work is admitted, but whose financial status is still in need of Government assistance. Apparently the subject is still under discussion. In the meantime it is encouraging to note that a sum of £16,400 has been earmarked for the purpose.

Particularly satisfactory are Sir Samuel Hoare's remarks under the heading "development of air routes." The proposed flight to the Cape, in which the South African Air Force is to co-operate, is in pursuance of the policy established some time ago, and which was inaugurated by the flights from Cairo to Kano and Cairo to the Cape last year. Very welcome is also the announcement that it is intended to carry out a long-distance flight with flying-boats with a view to developing the service between India and the Far East.

As usual, one of the most unsatisfactory Votes is No. 10, the Air Ministry. Why it should cost £687,000 to administer a service the total net expenditure on which is only £15,550,000, is somewhat difficult to understand, and although this particular vote shows a reduction this year of £74,000, there is still a very long way to go before the cost of the Air Ministry can be regarded as reasonable, especially as this Vote does not include the cost of the technical people, research, etc., but is merely administrative.

* * *

Empire Air Defence

With the Air Estimates a topical subject for discussion, we have thought that a brief outline of the organization, distribution and strength of the Air Defences of the British Empire might be of interest and assistance, and consequently a large section—in "R.A.F. blue"—of this week's issue of *FLIGHT* is devoted to an illustrated resumé of the organization of the air forces at home and in the Dominions, from which it should be possible to form a general idea of the manner in which the various problems are being attacked.

Following the article dealing with the organization and strength of the air forces will be found a section dealing with the flying equipment in use, including illustrations and brief descriptions of the various types of machines. This, in turn, is followed by a section dealing with types of aircraft which are either of an experimental character, or have just passed the experimental stage, but have not yet been issued to the squadrons for whom they are intended. Many of the types in this section, it should be realised, are about to become standard equipment, although for various reasons it has not been possible to indicate which types are to go into production and which are not.

Finally, there is a section dealing briefly with the types of aero engines in use by, or about to be issued to, the Royal Air Force. In this connection it should be understood that many engines of very recent type are still regarded as secret, and thus cannot even be mentioned let alone described or illustrated.

THE AIR ESTIMATES, 1927-28

A Net Decrease of £450,000

THE Air Estimates for the financial year 1927-28 were issued on March 5, and show a net decrease as compared with last year's Estimates of £450,000. The gross estimate is £19,986,400, but appropriations-in-aid are expected to reach the value of £4,436,400, thus reducing the total to £15,550,000, as compared with a net estimate of £16,000,000 for last year. Out of the net total, non-effective services account for £190,000 as compared with £245,000 the previous year. Personnel shows a decrease from 35,500 to 33,000.

Effective services are estimated to require the following amounts :—

Votes.	Net Estimates.	
	1927-28	1926-27
1 Pay, etc. of R.A.F.	3,160,000	3,405,000
2 Quarters, stores (except technical) supplies and transport ..	1,365,000	1,507,000
3 Technical and warlike stores (including experimental and research services)	6,424,000	6,091,000
4 Works, buildings and lands	1,900,000	2,347,000
5 Medical services	203,000	209,000
6 Educational services	507,000	432,000
7 Auxiliary and reserve forces	500,000	406,000
8 Civil aviation	464,000	462,000
9 Meteorological and miscellaneous effective services	150,000	135,000
10 Air Ministry	687,000	761,000
Total effective services	15,360,000	15,755,000
11 Non-effective services (half-pay, pensions and other non-effective services)	190,000	245,000
Total effective and non-effective services	15,550,000	16,000,000
Total net decrease	£450,000.	

Personnel

The grouping and numbers of personnel this year are as follows :—*Air Officers* : Vote 1, 20 ; Vote 6, 3 ; Vote 7, 1 ; Vote 10, 11 ; total 35. *Other Commissioned Officers* : Vote 1, 2,814 ; Vote 3, 32 ; Vote 5, 204 ; Vote 6, 166 ; Vote 7, 55 ; Vote 10, 129 ; total, 3,400. *Cadets* : Vote 6, 120 ; total, 120. *Warrant Officers* : Vote 1, 253 ; Vote 3, 1 ; Vote 5, 11 ; Vote 6, 45 ; Vote 7, 9 ; Vote 10, 1 ; total, 320. *Non-commissioned Officers* : Vote 1, 3,930 ; Vote 3, 3 ; Vote 5, 203 ; Vote 6, 474 ; Vote 7, 89 ; Vote 10, 1 ; total, 4,700. *Aircraftmen* : Vote 1, 18,843 ; Vote 5, 526 ; Vote 6, 890 ; Vote 7, 263 ; Vote 10, 3 ; total, 20,525. *Apprentices* : Vote 1, 200 ; Vote 6, 3,300 ; total, 3,500. *Enlisted Indian personnel in Iraq* : 400 ; total, 400. Total number to be voted : 33,000. It is pointed out that this includes Army personnel attached to the Royal Air Force.

Financial Expenditure

Under Vote 1 the summarised figures are as follows : Pay and personal allowances of officers, £1,227,000 ; pay and personal allowances of airmen, £2,101,000 ; marriage allowance, £99,000 ; miscellaneous allowances and payments, £31,000 ; civilians, £772,000 ; service gratuities to airmen on discharge, etc., £23,000 ; recruiting staff and expenses, £8,000 ; gross total, £4,261,000. Appropriations-in-aid, £1,101,000. Net total, £3,160,000, which represents a net decrease of £245,000.

Under Vote 2 the summarised figures are : Lodging allowances and billeting, £123,000 ; barracks services, £57,000 ; fuel and light, £230,000 ; general stores, £199,000 ; clothing, £245,000 ; provisions and horses, £671,000 ; transport, £120,000 ; gross total, £1,945,000. Appropriations-in-aid, £680,000. Net total, £1,365,000, a net decrease of £142,000.

Vote 3, *Technical and Warlike Stores*, provides for the following amounts : aeroplanes, seaplanes, engines and spares, £904,000 ; experimental and research establishments, £100,000 ; aeronautical inspection department, £147,000 ; aircraft technical and warlike stores, £157,000 ; armament and ammunition, £390,000 ; electrical stores, £239,000 ; miscellaneous research, £260,000 ; miscellaneous materials, £23,000 ; balloons and hangars, £42,000 ; mechanical and other transport, £241,000 ; petrol and oil, £552,000 ; rewards to inventors and miscellaneous claims (including war lia-

bilities), £60,000 ; purchase of airships, £90,000 ; airship development, £362,000 ; gross total, £8,789,000. Appropriations-in-aid, £2,065,000. Deduct for probable underspending on the vote as a whole, £300,000. Net total, £6,424,000, a net increase of £333,000.

The summarised statement under Vote 4, *Works, Buildings and Lands*, is as follows : Staff for works services, £224,000 ; new works, additions and alterations, amounting to £2,500 each and upwards, £1,455,000 ; ditto under £2,500 each, £120,000 ; ordinary repairs, renewals and maintenance, £536,000 ; grants in aid of works, £20,000 ; purchases of lands and buildings, £153,000 ; rents, compensations and reinstatements, £40,000 ; incidental expenses of Air Ministry estates, £13,000 ; provision of telephone and telegraph services, £4,000 ; miscellaneous works services, £11,000 ; stores and plant for works, £14,000 ; machine tools, £15,000 ; gross total, £2,577,000. Deduct for probable underspending on the Vote as a whole, £200,000. Appropriations-in-aid, £477,000. Net total, £1,900,000, a net decrease of £447,000.

The *Medical Services*, Vote 5, are estimated to require £203,000, as follows :—Pay and personal allowances of officers, £131,000 ; pay and personal allowances of airmen, £102,000 ; nursing service, £25,000 ; fees, etc., to civil medical practitioners, £3,000 ; civilians employed in hospitals and sick quarters, £10,000 ; medical stores and supplies, £11,000 ; payments to hospitals, £30,000 ; miscellaneous charges, £3,000. Gross total, £315,000. Appropriations-in-aid, £112,000. Net total, £203,000, a net decrease of £6,000.

Educational Services, Vote 6, are estimated to require the following amounts :—Imperial Defence College, £2,750 ; R.A.F. Staff College, Andover, £13,000 ; R.A.F. Station and Cadet College, Cranwell, £73,250 ; School of Technical Training, Halton, £274,000 ; Electrical and Wireless School, Flower Down, £77,000 ; School of Technical Training, Manston, £42,000 ; general and vocational training, £42,000 ; miscellaneous educational services, £5,000. Gross total, £529,000. Appropriations-in-aid, £22,000. Net total, £507,000, a net increase of £75,000.

Vote 7, *Auxiliary and Reserve Forces*, is estimated to require £500,000, as follows :—*R.A.F. Reserve* : Pay and personal allowances of permanent staff, £4,000 ; pay and personal allowances during training, £14,500 ; retaining fees and reserve pay, £200,000 ; capitation payments to civil companies for training courses, £181,000 ; miscellaneous expenses, £1,000. *Special Reserve and Auxiliary Air Force* : Pay and personal allowances of headquarters staff, £7,000. *Special Reserve* : Pay and personal allowances of regular personnel, £37,000 ; training, etc., £2,000 ; miscellaneous expenses, £700. *Auxiliary Air Force* : Pay and personal allowances of regular staff, £21,000 ; grants to county associations, £14,000 ; training, etc., £6,000 ; miscellaneous expenses, £8,000. *University Air Squadrons* : Pay and personal allowances of R.A.F. instructors, £2,900 ; miscellaneous expenses, £1,000. *Voluntary Aid Detachments* : Miscellaneous expenses, £300. Gross total, £500,400. Appropriations-in-aid, £400. Net total, £500,000, a net increase of £94,000.

Civil Aviation, Vote 8, is estimated to require the following amounts :—Civil aviation aerodromes, £28,000 ; air routes, surveys, etc., £31,000 ; technical equipment, £16,000 ; works, buildings and lands, £150,000 ; miscellaneous, £2,000 ; civil aviation subsidies, £247,000. Gross total, £474,000. Appropriations-in-aid, £10,000. Net total, £464,000, a net increase of £2,000. This Vote does not include the cost of the headquarters staff of the Director of Civil Aviation, which is paid from Vote 10, nor the cost of Meteorological services at civil aerodromes, which are provided for under Vote 9.

It is estimated that Vote 9, *Meteorological and Miscellaneous Effective Services*, will require the following amounts :—Compensation for losses, etc., £12,000 ; losses by exchange, etc., £300 ; payments to the War Office in respect of prison services, £6,000 ; telegraphic and telephonic charges, and postage abroad, £51,500 ; meteorological services, £85,000 ; miscellaneous, £18,000 ; allowances to ministers of religion, £6,200. Gross total, £179,000. Appropriations-in-aid, £29,000. Net total, £150,000, a net increase of £15,000.

£687,000 is estimated to be required in order to pay for the *Air Ministry*, Vote 10, as follows :—Salaries of the Air Council, and Department of the Secretary, £315,200 ; salaries of the Department of the Chief of the Air Staff, £132,600 ;

salaries of the Department of the Air Member for Personnel, £43,600; salaries of the Department of the Air Member for Supply and Research, £125,900; salaries of the Directorate of Civil Aviation and the Accidents Branch, £17,100; salaries of the Meteorological Office, £48,400; pay of messengers, porters, etc., £26,300; contingent expenses, £900. Gross total, £710,000. Appropriations-in-aid, £23,000. Net total, £687,000, a net decrease of £74,000.

The last Vote, No. 11, is for *non-effective services*, which are estimated to require £190,000, as follows:—Rewards to officers, warrant officers, non-commissioned officers and aircraftmen, £350; half-pay of officers, £3,000; service and disability retired pay and gratuities of officers and nurses, £121,000; pensions and gratuities to wounded officers, £550; service and disability pensions and gratuities—warrant officers, non-commissioned officers and aircraftmen, £36,000; pensions, gratuities and allowances to widows, children, etc., £16,400; civil non-effective payments, recurrent charges, £6,600; civil non-effective payments, gratuities and other non-recurrent charges, £5,200; injury grants, £6,900; commutation of retired pay, wounds pensions, etc., £10,500; relief fund, £500. Gross total, £207,000. Appropriations-in-aid, £17,000. Net total, £190,000, a net decrease of £55,000.

As in previous years, the Air Estimates are accompanied by a Memorandum by the Secretary of State for Air, in which Sir Samuel Hoare elucidates certain points. This Memorandum is given in full below.

MEMORANDUM BY THE SECRETARY OF STATE FOR AIR

The total of the net Air Estimates which Parliament is asked to vote for the coming year is £15,550,000, being a figure of £16,050,000 reduced by a "super-cut" for underspending (on Votes 3 and 4) of £500,000. The corresponding figures for the current year were £16,000,000, similarly reduced by a "super-cut" (on Vote 4) from £16,150,000.

The gross Estimates include expenditure on the Middle East and the Fleet Air Arm (repaid by the Colonial Office and Admiralty). It is satisfactory to note that there is a reduction of no less than £680,000 in Air expenditure in the Middle East. This large decrease is due to the reduction of the Imperial Forces in Iraq which has been rendered possible by the continued success of the Air Command combined with the more promising political and military outlook. The increase on the Fleet Air Arm represents normal development in accordance with the Admiralty programme of aircraft carriers.

The detailed figures are as follows:—

	1926. £	1927. £	Inc. or Dec. £
Gross (total of expenditure sub-heads)	21,014,500	20,486,400	— 528,100
Deduct "super-cut"	150,000	500,000	+ 350,000
Gross Estimate	20,864,500	19,986,400	— 878,100
Deduct Appropriations-in-Aid	4,864,500	4,436,400	— 428,100
Net Estimate	16,000,000	15,550,000	— 450,000
Appropriations - in - Aid—			
Middle East (Air and Ancillary Services)	2,921,500	2,257,000	— 664,500
Middle East (supplies to British and Indian troops on repayment and other recoveries)	299,800	283,000	— 16,800
Aden	—	110,000	+ 110,000
Fleet Air Arm	681,000	882,000	+ 201,000
Ordinary Appropriations-in-Aid	962,200	904,400	— 57,800
Total Appropriations-in-Aid	4,864,500	4,436,400	— 428,100

The total amount required for ordinary services of the Royal Air Force, including Home Defence, is little altered. Whilst there is a decrease on *personnel* and on works and buildings, there is an increase on technical equipment, particularly upon new types of machines. The number of front

line, reserve and auxiliary units, is continuing to rise gradually. The slowing down of the expansion programme and the constant scrutiny of establishments have made their effect felt in a reduction in capital expenditure on new aerodromes and buildings and in the numbers of *personnel* under training. On the other hand, war stocks are on the point of exhaustion, and new types of machines and engines are increasingly coming into use, with the inevitable result of a larger expenditure on the re-armament of squadrons.

Imperial Conference

Important discussions took place at the Imperial Conference in regard to air development, both in its military and its civil aspects. Particular attention was given to the urgent need for developing Empire air routes with the object of increasing the mobility of Imperial air power and furthering Imperial air services. I am glad to say that agreement was reached upon a number of far-reaching proposals, which should lead to a system of closer co-operation between the various Governments of the Empire than has hitherto existed. The progress made with the experimental programme of airship development was closely reviewed, and indication was given of intended co-operation by the Dominion and Indian Governments. The proceedings are recorded in Command Papers 2768 and 2769. Further reference is made to these matters below, but it seems proper to record here that what I hope may be called without exaggeration the dawn of a new era in Imperial communications, whether for purposes of defence or commerce, is in sight.

Strength and Distribution of the Royal Air Force

The development of the Royal Air Force during the current financial year has followed the programme which was indicated in the memorandum issued with the Air Estimates for 1926. The operational units now maintained are equivalent to 63 squadrons, of which 56 are on a regular basis.

Two new non-regular squadrons (one Special Reserve and one Auxiliary Air Force) have been formed and the Home Defence Force has been increased also by the addition of one regular squadron, which became available through reduction in the Imperial garrison in Iraq. The Home Defence Force now consists of 28 squadrons, including seven on a non-regular basis, and more than half the original programme of 52 squadrons has thus been completed.

It is intended to form two new regular squadrons for Home Defence during the financial year 1927. In addition, one new non-regular squadron will be formed.

Provision is made for five new flights (the equivalent of 2½ squadrons) for the Fleet Air Arm. These are required for the complement of aircraft for H.M.S. *Courageous*, which is due to commission as an aircraft carrier in the course of the financial year. The strength of the Fleet Air Arm will thereby be raised from 18 to 23 flights or the equivalent of about 11½ squadrons.

One new squadron will also commence to form for Army co-operation at home, in addition to the four squadrons already provided. This is called for by the development of Catterick as an Army Training Centre.

It will thus be seen that it is proposed, in all, to increase the strength of the Royal Air Force during the year by the addition of approximately six squadrons or their equivalent.

As a consequence of the settlement of the Northern Boundary question and of the progress in the development of the Iraq Army, the air garrison in Iraq is being reduced from eight squadrons to five, whilst the military garrison has been reduced during the last 12 months from four to three battalions and another battalion will be withdrawn without replacement in the course of the next few weeks. In all 11½ squadrons are at present located in Middle Eastern theatres. Six squadrons continue to be maintained in India.

Development of Air Routes

The policy of testing and developing the mobility of the air arm by means of long-distance flights, has been pursued during the past year, and will be continued as part of the normal training exercises of the Royal Air Force.

The flight by Service aircraft from Cairo to Capetown and back—the preparations for which were referred to in my memorandum attached to the Estimates for 1926—was most successfully completed. The original plan of the flight was extended and the aircraft engaged finished the tour by flying from Cairo to England after being refitted for this purpose with float under-carriages. The total distance covered was approximately 14,000 miles. It is intended that a similar flight should be undertaken during the present year and arrangements have been made that on this occasion aircraft of the South African Air Force shall be associated with the flight.

Preparations are in progress for the carrying out of a long-distance flight with flying boats, with the object of developing

the Service air route between India and the Far East. These boats will be provided during 1927, and the intention is that in 1928 they should make an extensive cruise as a self-contained unit in Far Eastern waters, visiting finally some of the Australian ports. A survey of the route is at present being carried out by a ground party.

I attach the greatest possible importance to the development of these strategic air routes, which are essential to the effective and economical employment of the Air Arm in the field of Imperial defence. A sum of £30,000 is taken in the estimates for expenditure on landing grounds and refuelling bases in connection with the development of these air routes.

Training and Experimental Establishments

The upkeep of the Service squadrons of the Royal Air Force in *personnel* and equipment is dependent on the maintenance of an adequate organisation for the training of pilots and mechanics and for providing instruction in specialist subjects, such as aeronautical engineering, wireless telegraphy, photography, aerial gunnery and co-operation with the Navy and Army.

These establishments are a necessary and integral part of the organisation for the Air Service, and the technical complexities inherent in training, both for work in the air and for the upkeep of material on the ground, require that they should be of an elaborate kind.

As regards flying instruction, four schools are maintained, in which pupils, starting with elementary training, reach in due course the degree of proficiency at which they are qualified to pass into Service squadrons. Each of these schools is organised to train between 70 and 80 pupils. Instruction in the art of flying is a matter of individual tuition, and the flying training schools necessarily demand a large complement of instructors and aircraft if the risk of accident is to be minimised and the training adjusted to the individual qualities of the pupils and to the characteristics of the various types of aircraft which they will fly in the squadrons.

The schools provide training for short-service commission officers and airmen pilots, and for officers attached to the Royal Air Force from the Navy and Army. The initial flying training for permanent officers is supplied at the Cadet College, Cranwell.

The instruction of a pilot is not complete even when he has passed from training machines and has learnt to fly the more advanced types of aircraft. Further instruction in the air is needed in the specialist branches which are essential to the technique of a combatant Air Service. These comprise formation flying, co-operation with the Army on land, co-operation with the Navy over sea, aerial gunnery, wireless communication between aircraft in flight and from aircraft to the ground, air photography, and practice in the use of important ancillary equipment, such as parachutes, searchlights, &c. The Central Flying School fulfils the most important function of training officers who are already qualified as pilots to become instructors of other pilots.

Much flying is also carried out at the experimental stations at Martlesham Heath and at Felixstowe, where new types of aeroplanes and seaplanes are tried out before being passed for adoption for general service, and at the Royal Aircraft Establishment at Farnborough.

Sufficient aircraft are also maintained at Headquarter units and at training establishments, other than those directly concerned with flying, to enable the staffs of those units to keep in flying practice.

It will be readily appreciated that all these various training requirements absorb collectively a large number of aircraft. Differences of function and equipment as between Service squadrons and training establishments, and as between the different kinds of training establishments themselves, make it difficult to express their importance in terms of any conventional unit; but their flying activities form a large addition to those of the Service squadrons, and cannot be dismissed as merely a form of the ancillary ground organisation of the Royal Air Force.

Personnel

The Estimates for 1927 reflect much more fully than was possible last year the decision of the Government reached late in 1925, to retard temporarily the expansion of the Royal Air Force. I have taken special steps during the past year to reduce *personnel*, the number of which, owing to the length of time (varying from one to three years) necessary to secure adequate technical training, had been increased by abnormal entries to meet the then growing requirements of the Home Defence Force. This is the main reason for the reduction of Vote A (maximum number of *personnel* to be

borne during the year) by 2,500 to 33,000. It should be understood, however, that this reduction is only a temporary one; as the Home Defence expansion proceeds in subsequent years the provision in Vote A will necessarily increase. Other reasons for the reduction this year in Vote A are the constant revision of establishments, the withdrawal of air forces maintained in Iraq and the progress of the policy of "civilianisation." The Iraq withdrawals affect Vote A mainly through the reduction which has been made possible in the ancillary *personnel* engaged on supply, transport and medical duties. The replacement of service *personnel* wherever possible by civilians has proceeded steadily as a result of the systematic investigation of unit establishments.

Requirements of officers have been further reduced by an increase in the number of airmen pilots, the establishment of whom now stands at 242. Additional responsibility will also be given to airmen pilots who will be eligible to undertake, in addition to their flying work, certain technical duties which have previously been performed by officers. This extensive substitution of airmen pilots for short service officers is attended by one disadvantage, namely, that the flying Reserve (in which short-service officers are liable to serve for a period) is proportionately diminished. To obviate this it has been decided that in future airmen pilots shall return to the duties of their trade after five years' flying service and shall keep in flying practice and be liable for flying duties in war.

In connection with the Imperial Conference valuable meetings have been held with the Defence representatives of Canada, Australia, South Africa and New Zealand to discuss co-operation in *personnel* matters between the Royal Air Force and the Dominion Air Forces. The proposals discussed will not only assist the interchange of ideas between the air forces of the Empire, but will effect economy through the division of the cost of flying training between the Imperial and Dominion Exchequers. An instance of such an arrangement is provided by certain officers trained in Australia who have recently joined the Royal Air Force on short-service commissions for a period of four years, after which they will return to Australia and give a period of reserve service to the Royal Australian Air Force. By this means both Imperial and Australian requirements have been met and each Government has borne its appropriate share of the cost of initial flying training.

The form of Vote 1 (Pay, etc.) and Vote 6 (Educational Services) has been changed by the transference from the former to the latter of the cost of the School of Technical Training (Men) and the Electrical and Wireless School. Vote 1 amounts to £4,261,000 gross and £3,160,000 net—a reduction of £406,000 and £245,000 respectively. Discounting the sums transferred to Vote 6, these figures represent reductions due to the savings in *personnel* referred to above and the revised rates of pay introduced for new entrants in 1925.

During the past year the boys' training establishment at Cranwell has been transferred to Halton, where all aircraft apprentices will be trained in future, except those instructed in electrical and wireless trades, who will remain at the Electrical and Wireless School at Flowerdown. This concentration of aircraft apprentice training at Halton, which has resulted in definite administrative savings, is the final realization of the policy which was laid down in 1919, and which has since been steadily pursued by my predecessors and myself. I am confident that the success already attained by this scheme of training will become more and more complete. Provision is also made in Vote 6 for the Air Ministry's share of the cost of the new Imperial Defence College. As the outcome of these changes, Vote 6 stands at £529,000 gross and £507,000 net, apparent increases of £81,000 and £75,000 on 1926, though in point of fact there is an actual decrease of approximately £40,000.

Vote 5 (Medical Services) shows a reduction of £32,500 in the gross amount, which stands at £315,000. This is mainly due to reductions in the medical establishments of Iraq, where I have arranged for the British and Indian Hospitals, hitherto maintained as separate establishments, to be amalgamated. The net vote, from which the cost of Middle East services is excluded, shows a slight saving and stands at £203,000. This result may be regarded as satisfactory, having regard to the improved rates of pay which, following the investigations of an interdepartmental committee, it was found necessary to grant in 1926, to remedy the acute shortage of medical officers in the fighting services.

Reserve and Auxiliary Forces.

No considerable alterations in policy are anticipated in connection with the Reserve and Auxiliary Forces, the object being to develop progressively these adjuncts to the regular

service on the lines already laid down. Vote 7 is consequently increased by £94,000. The five civil schools engaged in training reserve officers are all employing aircraft of modern capabilities and performance for this purpose. The experimental scheme of *ab initio* flying training in the reserve has proved successful in practice and economical in operation and is to be continued on a more permanent basis.

It is anticipated that considerable progress will be made with the development of the existing seven Special Reserve and Auxiliary Air Force squadrons during the year. The proposed formation of one additional non-regular squadron has already been mentioned.

The "Air Squadrons" at the Universities of Oxford and Cambridge, the constitution and objects of which I described last year, have made satisfactory progress during 1926, and no alteration is being made in their organisation. For the past year the membership of each "squadron" was limited to 25, but in October last this was increased to 50.

Technical Equipment

Vote 3 (Technical Equipment and Research) stands at £8,498,000 gross and £6,424,000 net, a net increase of £333,000. This figure is arrived at after an overhead deduction of £300,000 to allow for unexpected delays in contract work and consequent failure to spend, on the lines of the similar deduction referred to in the memorandum accompanying Air Estimates, 1925-26. The increase on the total of the sub-heads is therefore £633,000. This is partly accounted for by increased requirements for airships and for research and technical development, but mainly by the increased provision necessary for the replacement of older types of aircraft and engines and for the formation of new squadrons.

Provision is made in the gross estimate for the formation of additional flights for the Fleet Air Arm, and there is a corresponding increase in the grant from the Admiralty. Decreases in the appropriations-in-aid from the Middle East and India reflect the reductions in the strength of the Royal Air Force in Iraq and the reduced cost of maintenance in India.

The policy of replacing aeroplanes and engines of war-time design by modern types is making steady progress, and it is the intention that in future no more aircraft or engines of war-time designs should be bought. The provision for maintenance is less than in 1926, a decrease which the experience of the past year has shown to be justified.

Research and Technical Development

Appendix II shows the funds allotted under various sub-heads of Vote 3 to scientific research and technical development. It will be seen that there is a net increase of £128,000, as compared with 1926, of which the major part is in respect of research and development on aeroplanes and engines. On the aeroplane side this is due to provision for the purchase of a larger number of aircraft of types which have already been flown experimentally, for development up to the point at which they may, if suitable, be standardised for service or civil purposes. Similarly, provision has been made for the purchase of a number of engines in an advanced stage of development, for installation in experimental aircraft, so as to combine the latest advances both in aircraft and engine design in one machine. The increase under sub-head G. 1 is mainly in respect of metal construction.

The programme for the construction of new experimental aircraft provides for putting in hand 11 types. Delivery will shortly be made of three machines of the autogyro type, for which provision was made last year, and it is intended to carry out investigations on these aircraft during 1927, with a view to ascertaining the future possibilities of this novel development in flying.

The expenditure on aircraft and engines specially designed for very high speed has (as with motor-cars) produced very valuable information from the point of view of research. Provision has accordingly been made in these Estimates for three more aircraft of this type.

There has been a slight change in the organisation of the Royal Aircraft Establishment, Farnborough, by the creation of two posts of Superintendent for Scientific Research and Technical Development respectively. This change is in conformity with the division of responsibility at the Air Ministry between the Director of Technical Development and the Director of Scientific Research, and has been effected without additional cost by substituting the two posts of Superintendent for appointments already approved on the establishment. At the same time, the title of the head of the establishment has been changed to Chief Superintendent.

AIRSHIPS

During the financial year 1926 the period of preliminary research and experiment has been completed, and the con-

struction of both airships begun. The present Estimates provide for construction to proceed during 1927, and it is anticipated that both airships will make their first flights by 1928.

The analysis of the results of the aerodynamic experiments with R.33 was completed in the early summer, and showed general agreement between the full-scale figures and those obtained from similar model experiments in a wind tunnel—thus enabling the latter to be accepted with confidence as the basis of design. R.33 was re-commissioned at Pulham in the autumn for the double purpose of testing the new mast-head gear on the Cardington mast and of carrying the aeroplane experiments of 1925 a stage further. On each of her two flights between Pulham and Cardington she took the air with two single-seater fighter aircraft attached, and released one over Pulham and the other over Cardington, thus actually filling the role of an aircraft carrier with service aircraft. No other country has so far carried out trials of this character with service aircraft.

An important full-scale constructional experiment was carried out by the erection of a complete section of R.101 (the airship being built at the Royal Airship Works) for test purposes. The tests gave satisfactory results, in general accord with the designer's calculations, and, as was hoped, supplied new information of great value in connection with the detailed design of the hull structure. The test section, R.33, and the new mast at Cardington were inspected by the Dominion Premiers attending the Imperial Conference in November, 1926.

Considerable progress has been made with airship works services, as will be seen from the Estimates. Both the shed and mast at Cardington have been completed, as has the mast at Ismailia. The shed at Karachi is proceeding satisfactorily.

The Imperial Air Communications Sub-Committee of the Imperial Conference displayed a keen interest in the development of Empire airship services, and recommended that the Governments of the Dominions concerned and of India should consider the question of erecting mooring masts for the purpose of demonstration flights in 1928-29, whilst the Home Government should consider the question of erecting a second shed at Cardington. The Dominion of Canada and the Union of South Africa have already signified their willingness to fall in with this recommendation.

The Estimates provide accordingly under sub-head O of Vote 3 for £50,000 as a first instalment of the cost of a second shed at Cardington. Provision is also made for visits by officers of the airship and meteorological staffs to South Africa and Australia in one direction and to Canada in the other. Advantage will be taken of the visits to Africa and Australia to examine possible sites for intermediate bases with a view to future development.

For the construction of R.100, the airship which is being designed and built by a private company, £90,000 is provided under Sub-head N of Vote 3, as against £30,000 in 1926. Provision has been made (under sub-head O) for the training of personnel for crews in the latter part of the financial year, with a view to trials in the early part of 1928.

Works

Vote 4 (Works, Buildings, and Lands) shows a net decrease of £447,000 as compared with 1926. Provision is taken for the continuation of the programme of land purchase and erection of buildings connected with the formation of the Home Defence Air Force to the extent of £870,000, as compared with £1,130,000 in 1926. This allotment provides for the commencement of works services at two stations recently acquired, one for two regular bombing squadrons and the other for a non-regular squadron. The total provision for major works services at home is £1,140,000. In the interest of economy, provision for permanent buildings for the Cadet College at Cranwell is still postponed.

As regards Egypt, provision is taken in accordance with the policy of gradual replacement or improvement of war-time accommodation.

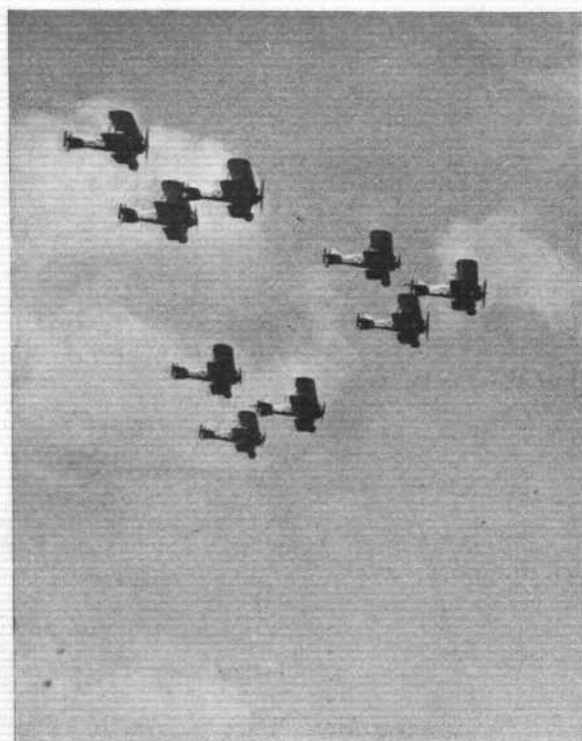
The total net provision for services in Iraq, Palestine, and Trans-Jordan shows a reduction of £82,500 as compared with 1926.

In accordance with the recommendations of the Estimates Committee, it is proposed to abandon the practice of grouping under general items provision for a number of similar services at various stations—e.g., married quarters. To this end the provision under such general items as are included this year is confined to the sums necessary for the completion of services already in hand.

The development of the Singapore base entails the provision

(Concluded on page 149.)

AIR DEFENCES *of the* BRITISH EMPIRE



Compiled by
"Flight"

AIR DEFENCES OF THE EMPIRE

By MAJOR F. A. DE V. ROBERTSON, V.D.

WHEN one considers the air defences of the Empire, it is very necessary to keep clear in one's mind the fundamental distinction between an air force proper on the one hand, and flying units which are merely air arms of an army or a navy on the other. An air force proper of any nation contemplates the use of air power to achieve the martial objects of the Government which it serves. In many cases its chief task will be to repel hostile air attack and to compass, so far as is possible, the destruction of the hostile air force. It operates at the command of an Air Minister and, when in a fully developed condition, it is trained and directed by a specialised air staff. A naval air arm and a military air arm, on the other hand, are ancillary troops of a navy or an army. Their task is to assist in the accomplishment of naval or military objects. Although, for the sake of convenience, they may in some cases (e.g., Great Britain) be raised and trained under an Air Minister, their action in time of war must be dictated by a Navy Minister or an Army Minister. Consequently such air arms cannot properly be taken into consideration when one computes the air strength of this Empire.

Great Britain is the only country in the British Empire which maintains an air force proper as well as both a fleet air arm and an army co-operation air arm. Iraq, which we must certainly consider, although it is not part of the British Empire, is defended by an air force, assisted by an ancillary military arm which includes armoured car companies provided by the Royal Air Force and some military units provided by the army in India. In India the air squadrons are still in the position of an army air arm, the defence of the country, other than naval defence, being in the charge of the Commander in Chief of the Army in India. The Middle East Command, which embraces Egypt, Aden, Palestine, and Transjordan, is in a position somewhat analogous to that of Iraq. In New Zealand the position is somewhat nebulous, but the air reserve which exists seems to be part of the army, which in itself is not a regular force. In the Irish Free State the one existing air squadron is definitely part of the military force and wears army uniform. In South Africa there is an air force which is becoming independent, though it naturally exercises itself in army co-operation work, and showed its proficiency in that art during the Johannesburg rebellion. In Australia and Canada the air forces maintained by those Dominions are definitely independent air forces, and each has received the title of "Royal," which sufficiently marks its status.

Mobility

A point of policy in the development of the Air Force, on which the Air Minister is continually insisting in his speeches, is the development of mobility. Even when the present programme of expansion has been completed, and even reckoning upon the co-operation of the air forces of Australia, Canada, and South Africa, our Empire air power will remain all too small for its responsibilities. A prophet need not necessarily incur the charge of rashness if he foretells that the completion of the present expansion programme (delayed as it has been as a result of the Locarno agreement) must be the starting point for a new scheme of increasing the strength of the Royal Air Force. In the meantime it is of prime importance to compensate for smallness of numbers by extra mobility. Fortunately, an air force lends itself particularly well to such treatment. The Air Ministry is working on three main lines to increase mobility. The first is by establishing and maintaining chains of aerodromes across the Empire. In this task many Dominion and Colonial Governments are co-operating. There is one chain from Malta down to Capetown. This was originally laid out in 1918, and was "reconditioned" for the flight of the four Fairey aeroplanes led by Wing Commander Pulford last year. There is also the eastward chain from Malta through Egypt, Palestine, Transjordan, Iraq, India, to Singapore, where a large air station is being prepared in connection with the naval base; and there are the chains of aerodromes in Australia, which form the southern extremity of this route. Canada also maintains a chain from the Atlantic to the Pacific. The only large gaps in these chains are between Great Britain and Canada, Great Britain and Malta, and Singapore and Australia. There are two ways of bridging these gaps without landing on foreign territory or in foreign

waters, and both are being followed up by the Air Ministry. One is by increasing the air endurance of aircraft through technical progress, and the other is by developing large airships which can act as carriers of aeroplanes. Progress on both these lines would not only bridge the existing gaps in the chains of aerodromes, but would make the air force mobile independently of those chains. On all these lines of advance it is desirable for the force to work in close touch with commercial flying, and so reduce the cost to each.

Another important point which makes for the mobility of the Empire's air strength is close liaison between the Royal Air Force and the air forces of the Dominions. This is sedulously maintained. The Air Ministry keeps the Dominion air forces regularly informed of all interesting developments, technical and otherwise. Officers from the Dominion air forces have attended the Staff College at Andover and other R.A.F. establishments in considerable numbers. There is also an arrangement by which Dominion officers can obtain short-service commissions in the R.A.F., at the expiration of which they are placed on the reserve of their local forces. Finally, the Governors-General of the Dominions can nominate a certain number of cadets for Cranwell College; and Dominion universities, like the universities of Great Britain, are channels of entrance into the Royal Air Force. Methods of flying training are common to all the British air forces, and so far as local conditions permit, Dominion organisation, especially in Australia, is similar to that of the Royal Air Force.

Therefore, in considering the Empire's air strength, we ought to take into account only Great Britain, Iraq, the Middle East, Canada, Australia and South Africa. The first three are served by the Royal Air Force and the latter three by locally raised air forces. At the same time consideration should be given to the special position of India and the possibilities of developments there.

GREAT BRITAIN

Even in Great Britain, which from the point of view of air power is, though not the strongest numerically, the most organized of all countries, whether inside the Empire or outside it, everything is not yet cut and dried. The aerial Home Defence Force is an entity which is clear enough, and there is nothing really ambiguous about the Fleet Air Arm and the Army Co-operation squadrons. But there remains a residue of the Coastal Area, namely, that which is concerned with coastal reconnaissance, which it is rather hard to place. The units are neither numerous nor large. There is a flight of five flying-boats in Great Britain and one of six float seaplanes in the Mediterranean. The latter must be taken as an element of sea power, but it does not seem to have been laid down whether the former makes for sea power or for air power. In the circumstances we may be justified in reckoning it in the air power category. Coast defence has always been a matter of some uncertainty even in the long history of the relations of army and navy.

In Great Britain, therefore, we find three main commands: (1) Air Defence of Great Britain; (2) Inland Area; and (3) Coastal Area. In estimating air power we may disregard the Inland Area, which is composed of such units as schools of instruction, stores depots, and the four army co-operation squadrons. Air Defence of Great Britain comprises all units of the Home Defence Force organized under three subordinate commands:—(a) Wessex Bombing Area; (b) Fighting Area; and (c) Special Reserve and Auxiliary Air Force squadrons, which are non-regular bombing squadrons. The headquarters of the Home Defence Force are at Uxbridge, and the present Air Officer Commanding-in-Chief is Air Marshal Sir John Salmond, K.B.E., K.C.B., C.M.G., C.V.O., D.S.O.

Wessex Bombing Area

The territorial designation given to this area indicates that in due course other bombing areas will be formed. At present the area includes all regular bombing squadrons wherever situated. The H.Q. are at Andover, and the area is commanded by Air Vice-Marshal Sir John Steel, K.B.E., C.B., C.M.G. The stations allotted to this area for the time being are:—Andover, Worthy Down, Netheravon, Spittlegate and Bircham Newton. Complete concentration in the allotted stations has not yet been carried out. The bombing



AIR DEFENCES OF GREAT BRITAIN: Sketch map showing the location of the various aerodromes and air stations of our home-defence scheme. The figures against the various air stations refer to the numbers of the squadrons stationed there. The small silhouette maps in the margin represent the various aerodromes, and are all drawn to a uniform scale.

["FLIGHT" Copyright]



squadrons are divided into: (a) day bombers with single-engined machines; and (b) night bombers with twin-engined machines. In the former class, a squadron consists of three flights, each of four machines, or 12 first-line machines per squadron; while in the twin-engined class (and this applies to all twin engined aeroplane units) a flight consists of five machines and a squadron has two flights or 10 first-line machines in all.

The squadrons of this area are distributed as follows:—

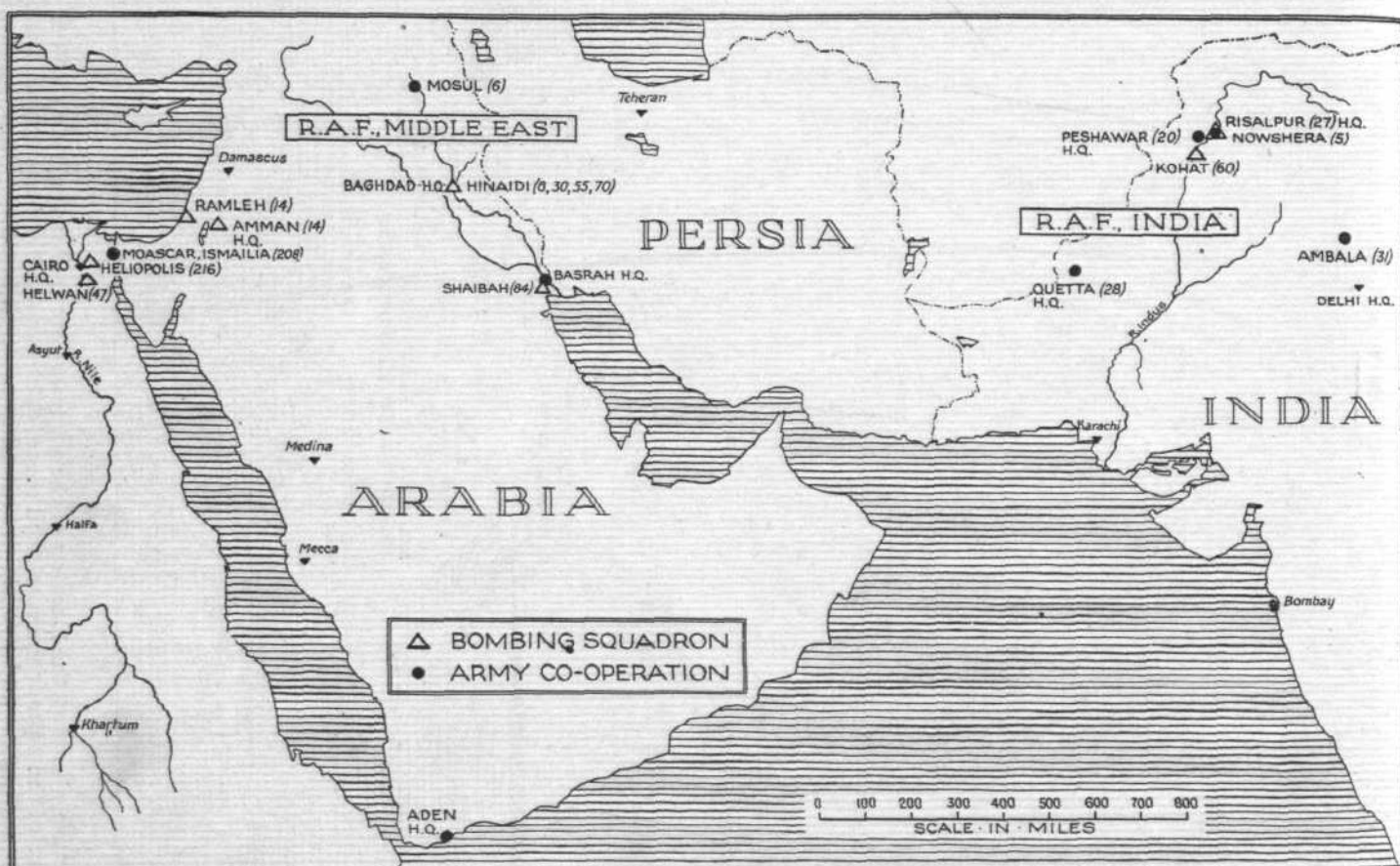
Day Bombers.			
No.	Machine Type.	Station.	
12..	Fox ..	Andover.	
11..	Fawn ..	Netheravon.	
100	Horsley ..	Spittlegate.	
39..	D.H.9a ..	Spittlegate.	
207	D.H.9a. ..	Eastchurch.	

Night Bombers.			
No.	Machine Type.	Station.	
58..	Virginia ..	Worthy Down.	
7..	Virginia ..	Bircham Newton.	
99..	Hyderabad ..	Bircham Newton.	
9..	Virginia ..	Manston.	

organized in three flights. All the aeroplanes are single seaters. The disposition of the squadrons is:—

No.	Machine type.	Station.
1	—	Tangmere.
3	Woodcock.	Upavon.
17	Woodcock.	Upavon.
19	Grebe.	Duxford.
111	Siskin.	Duxford.
29	Grebe.	Duxford.
23	Gamecock.	Kenley.
32	Gamecock.	Kenley.
25	Grebe.	Hawkinge.
41	Siskin.	Northolt.
43	Gamecock.	Tangmere.
56	Grebe.	Biggin Hill.

We may take the strength of the area as 144 first-line machines. But we must add to that figure the potential strength of other units contained in the area which might in time of war provide two more squadrons. These are: No. 24 Communication Squadron, which is stationed at Kenley and is equipped with Avros, Bristol Fighters and D.H.9a's; the Night Flying Flight at Biggin Hill; the Home Com-



THE ROYAL AIR FORCE IN THE EAST: This sketch map shows the location of R.A.F. air stations in Egypt, Middle East, and India. The system of indicating the nature of the squadrons stationed at the various centres is uniform with that employed in the map of Great Britain published on p. 131.

These nine squadrons together give us an establishment of 100 machines. But to them must be added two other bombing squadrons which are stationed at Martlesham for special duties and have been left under the Inland Area. These are:—No. 15, which is equipped with the Horsley, and No. 22. On mobilisation these would be added to the strength of the Wessex Bombing Area and would bring the total of machines up to 122 or 124.

Fighting Area

The Fighting Area is the really defensive section of the Home Defence Force, for the bombing commands must always take as their motto "Attack is the best Defence." The fighter squadrons are therefore arranged in a ring round London, the nerve centre of the Empire. The stations allotted to the area are:—Duxford, Northolt, Kenley, Biggin Hill, Hawkinge, Upavon, and Tangmere. Area headquarters are at Uxbridge, and the A.O.C. is Air Vice-Marshal H. R. M. Brooke-Popham, C.B.E., C.B., C.M.G., D.S.O., A.F.C. The strength of a fighter squadron is 12 first line machines

munication Flight at Northolt; and the Station Flight at Duxford. The usual establishment of an independent flight of single-engined machines is six, and of twin-engined machines is five. These three flights are variously equipped, and they are very short of flying personnel. So we may perhaps add 24 to the above figure of 144, and put the machine strength of the area down as about 168.

General Reserve

Three regular squadrons are held in General Reserve, namely, Nos. 24 (Communications), 39 and 207 Bombing Squadrons. In peace time these are included in the two areas of the Home Defence Force, Nos. 39 and 207 in the Wessex Bombing Area, and No. 24 in the Fighting Area, and all have been included in the lists given above.

Special Reserve and Auxiliary Air Force

These two forces are in process of formation, squadrons being raised one at a time as dictated by circumstances. The headquarters for both forces are at Sloane Square, London, and the A.O.C. is Air Commodore J. G. Hearson, C.B., etc.

All the units are bombing squadrons, some with twin-engined machines and some with single-engined machines. As in the case of the regular squadrons, the establishment of the former is 10 machines in two flights, and of the latter 12 machines in three flights. All the squadrons are raised and stationed in localities which are considered promising, and most of them bear territorial designations. The location of their home aerodromes, however, has no tactical significance; as on mobilisation, each squadron will move to a war station.

A Special Reserve squadron has regular personnel up to the equivalent of one flight and part of headquarters. An Auxiliary Air Force Squadron has an adjutant, a stores officer, and from 20 to 30 airmen provided by the regular Air Force. All the rest of the personnel must be citizen officers and airmen. At present, the units are as follows:—

Special Reserve

Twin-engined.

No. 502 Ulster Bombing Squadron. Aldergrove (Avro, Vimy).

Single-engined.

No. 503 Bombing Squadron. Waddington (Avro, Fawn).

Auxiliary Air Force

Single-engined.

No. 600 City of London Bombing Squadron. Hendon (Avro, D.H.9a).

No. 601 County of London B.S. Hendon (Avro, D.H.9a).

No. 602 City of Glasgow B.S. Renfrew (Avro, D.H.9a).

No. 603 City of Edinburgh B.S. Turnhouse (Avro, D.H.9a).

No. 605 County of Warwick B.S. Castle Bromwich (Avro, D.H.9a).

These two forces together represent a total of 82 first-line machines, the Avros being, presumably, for practice.

Coastal Area

No. 480 Coastal Reconnaissance Flight. Southampton. Calshot.

The Southampton is a twin-engined type, and so this unit gives us five first-line machines.

Machine Strength

We therefore arrive at the following totals:—

Air Defences—

Wessex Bombing Area (<i>circa</i>)	..	..	124
Fighting Area (<i>circa</i>)	..	..	168
S.R. and A.A.F.	..	..	82
Coastal Area	..	..	5

379

IRAQ COMMAND

The headquarters of the Iraq Command are situated in Baghdad, and the A.O.C. is Air Vice-Marshal Sir Edward L. Ellington, K.C.B., C.M.G., C.B.E., *p.s.c.* The squadrons stationed in the country are:—No. 6, Army-co-operation, Mosul (Bristol Fighter); Nos. 8, 30 and 55, Bombing, Hinaidi (D.H. 9A); No. 70, Bombing, Hinaidi (Victoria); No. 84, Shaibah (D.H.9A). The number of first-line machines is about 70. The A.O.C. also has under his command three armoured car companies of the R.A.F., one battalion of British infantry, two battalions of Indian infantry, and ancillary troops.

MIDDLE EAST

The Middle East Command comprises Egypt, Aden, Palestine and Transjordan. The headquarters are at Cairo, and the A.O.C. is Air Vice-Marshal T. I. Webb Bowen, C.B., C.M.G. In Egypt there are at present three squadrons, but another is being formed at Heliopolis, and will be added to the Middle East Command.

The squadrons stationed in Egypt are:—No. 208, Army Co-operation, Moascar, Ismailia (Bristol Fighter); No. 216, Bombing, Heliopolis (1 flight Vimy, 1 flight Victoria); No. 47, Bombing, Helwan (D.H.9A); No. 45, Bombing, forming (Vernon); Aden Flight, Aden (Bristol Fighter).

The Aden Flight is under the command of the military authorities. It is about to be increased to a squadron.

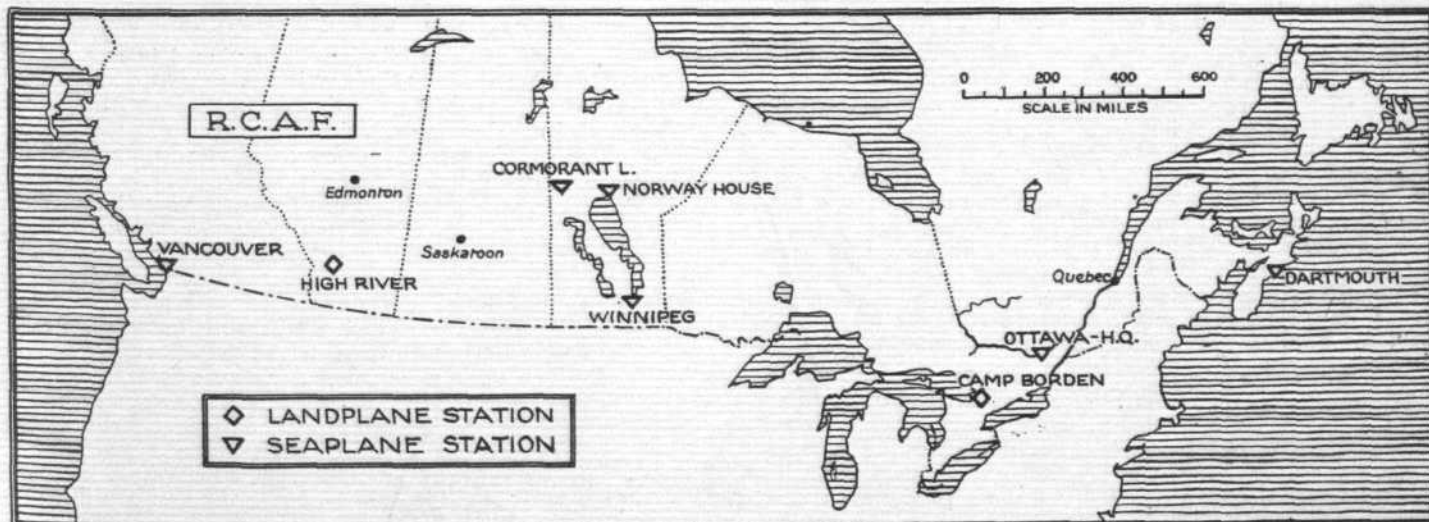
The total number of machines is 50.

Palestine and Transjordan

The headquarters are at Amman, and the A.O.C. is Group Captain L. W. B. Rees, V.C., O.B.E., M.C., A.F.C. No. 14 squadron (Bombing) is equipped with D.H.9A's, two flights being stationed at Amman and one at Ramleh. There is also one armoured car company of the R.A.F., and a wireless company provided by the Army. This command shows an establishment presumably of 62 first-line machines.

INDIA

The Royal Air Force in India is commanded by an Air Officer of the rank of Air Vice-Marshal, namely, Sir Geoffrey Salmond, K.C.B., K.C.M.G., D.S.O., *p.s.c.*, whose headquarters are at Delhi. It has undertaken some more or less independent actions against recalcitrant tribesmen on the North West Frontier. Moreover, there is always the possibility of air attack from Central Asia. We have, therefore, to consider the possibility of India establishing an independent air force in the future, and this may excuse an examination of what is at present undoubtedly a military air arm, consisting



Sketch map showing location of the various air stations of the Royal Canadian Air Force. It will be observed that they form a chain across Ottawa to Vancouver. The R.C.A.F. is largely occupied in survey work, forest patrol, etc.

But it must be borne in mind that these figures pay no regard to the establishments of training schools and development flights, although in Army Manœuvres, 1925, the School of Army Co-operation at Old Sarum put a special flight into the field; while for reasons given above the army co-operation squadrons and the fleet air arm have been deliberately excluded, as not contributing to air power in the true sense of the word.

only of army co-operation squadrons and day-bombing squadrons. If an air attack is ever encountered, a complement of fighter squadrons will become an immediate necessity. We need not discuss here whether India will always borrow squadrons from the R.A.F., or whether she will some day raise an air force of her own, on similar lines to those of the Indian Army. The air force in India is organised in three wings, all grouped along the North-West Frontier.

Following is the distribution, &c., of the squadrons:—
No. 1 Indian Wing (headquarters Peshawar); No. 60, Bombing, Kohat (D.H.9A); No. 20, Army co-operation, Peshawar (Bristol Fighter). No. 2 Indian Wing: Headquarters, Risalpur; No. 27, Bombing, Risalpur (D.H.9A); No. 5, Army co-operation, Risalpur (Bristol Fighter). No. 3 Indian Wing: Headquarters, Quetta; No. 28, Army co-operation, Quetta (Bristol Fighter). This gives a total of 72 first-line machines.

The H.Q. of the Royal Air Force in India has under its direct command No. 31 Army Co-operation Squadron (Bristol Fighter) which is stationed at Ambala in the Punjab. Some Siskin fighters and a Victoria took part in a display at Delhi on February 21, but are not on the Indian establishment.

CANADA

The Royal Canadian Air Force consists of a permanent regular air force with a civilian reserve. The flying list of officers gives about 80 names, in addition to which between 500 and 600 officers have gone through refresher courses in flying since the war, and would be available in an emergency. There is also in the Dominion a very large number of war pilots who have left the service, but some of whom would doubtless be able to do good work again. The Director of the R.C.A.F. is Group Captain J. S. Scott, M.C., A.F.C., A.D.C., *p.s.a.*, and the H.Q. are at Ottawa, where they form part of the Department of National Defence.

The force is engaged in civil operations for the benefit of other Government Departments, notably the Forest Department, and on occasions is employed by civil firms to carry out surveys, etc. This is an economical method of maintaining a nucleus air force which could be expanded in time of war as might seem desirable. The force, therefore, is organized, not in war squadrons, but in operations squadrons, of which there are five. The strength of these units and their equipment varies according to the nature of the operations entrusted to them—forest fire patrols, surveying, prevention of smuggling, etc. The machines are all of a civil type, and are mainly flying boats. In this connection we may comment on the success with which Canadian Vickers, Ltd., has undertaken the design of flying boats especially adapted to Canadian requirements. It is, however, not easy to assess the actual war strength of the Canadian Royal Air Force, but we shall probably not be far wrong if we put it down as five squadrons. The units are stationed as follows:—

- | | |
|---------------------------------------|----------------------------|
| No. 1 Operations Squadron (seaplanes) | .. Vancouver, B.C. |
| " 2 " " (landplanes) | .. High River, Alberta. |
| " 3 " " (seaplanes) | .. Ottawa (South March). |
| " 4 " " (seaplanes) | .. Dartmouth, Nova Scotia. |
| " 5 " " (seaplanes) | .. Winnipeg, Manitoba. |

Of these, No. 3 has at present a flying personnel of two officers, and No. 4 has only one officer. The Flying Training station is at Camp Borden in Ontario. There is also a Photographic Section at Ottawa.

The eastern part of Canada is all suitable for the use of seaplanes; the central prairies form one natural aerodrome for landplanes up to the base of the Rockies.

Two new stations will shortly be established on the shores of Hudson Bay, to watch the movement of the ice.

The Royal Canadian Air Force draws new flying blood from the Universities and from the Royal Military College at Kingston. The airmen are recruited from civil life.

The vote for the R.C.A.F. in the present financial year amounts to about \$3,000,000. In previous years it has not exceeded \$2,000,000.

AUSTRALIA

The Royal Australian Air Force is under the authority of the Minister of Defence (at present Sir Neville Howse, V.C.), and the Council of Defence. Subordinate to that body is the Air Board, which deals with all flying in the Commonwealth, while the R.A.A.F. is directly controlled by the Air Staff, consisting of a C.A.S. (at present Group Captain R. Williams, D.S.O., O.B.E.), and 17 members. The staff is organized in nine directorates. Thus, although the R.A.A.F. is still in an early stage of development, it is already in a higher stage of organization than any air force in the overseas Dominions. There are two squadrons which are still in what may be described as the "general utility" stage, exercising themselves in air fighting, army co-operation, and bombing, and using the "Gift Equipment" which was presented to the Commonwealth after the Armistice. There is also a Fleet

Co-operation Flight, which is at present employed on an aerial survey of the Great Barrier Reef off the coast of Queensland. It is notable that all the aircraft purchased since the war by the R.A.A.F. have been seaplanes. The units are stationed as follows:—

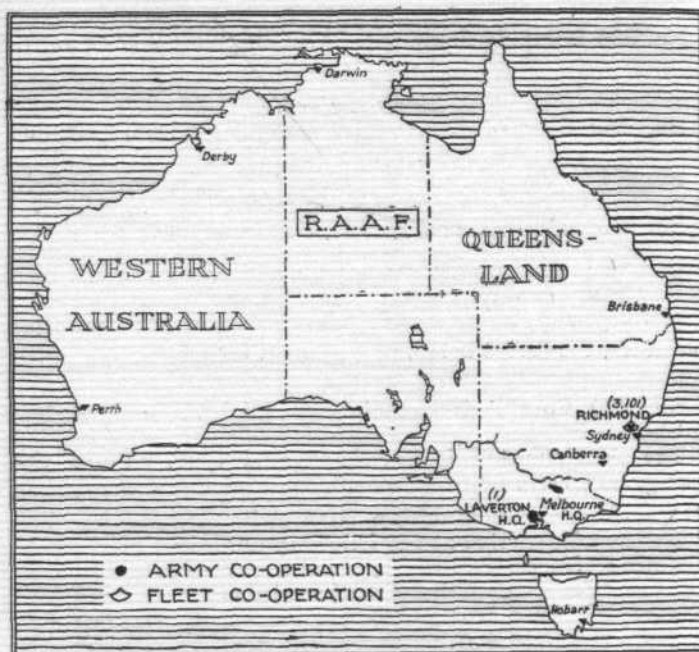
No. 1 Squadron at Laverton, near Melbourne.

" 2 Squadron at Richmond, 30 miles from Sydney.

(Each of these Squadrons has one flight of S.E.5.A.'s, one of D.H. 9's with Pumas, and one of D.H.9.A's, with Libertys.)

The Fleet Co-operation Flight, Seagull-Lion, has lately had its H.Q. transferred from Melbourne to Sydney. Its base during the Great Barrier Reef survey is at Bowen on the coast of Queensland.

These three units give a strength of 30 first-line machines. A Flying Training School and a School of Aeronautics are situated at Point Cook near Melbourne. The F.T.S. had on charge three Fairey 3D seaplanes, Eagle engines, which were purchased since the war, but the one in which



Sketch map showing location of Australian Air Stations.

Wing Commander Goble and Flight Lieut. McIntyre flew round the coast of Australia has been placed in a museum as a national relic. Near Sydney is the experimental establishment at which Wing Commander Wackett built his flying boat, the "Widgeon," with Puma engine.

The R.A.A.F. is manned in much the same way as the Special Reserve of the Royal Air Force, that is to say a squadron consists of one-third of regular personnel and two-thirds of citizen officers and airmen. The Fleet Co-operation Flight, however, is composed entirely of regular personnel. The citizen officers and airmen must do 25 days' training during the year, of which 18 days must be continuous camp. A man must do three months' continuous flying training in order to qualify for a commission in the citizen air force.

Behind the regular and citizen air force is the R.A.A.F. Reserve. All pilots and mechanics in the subsidised air lines must belong to this reserve, and all officers and airmen on leaving "the colours" must join the reserve. So far no *ab initio* training for the reserve has been undertaken. Citizen officers serve for eight years, of which four may be with the reserve, and citizen airmen go on to the reserve after three years on the active list. The reserve personnel would be absorbed into the first-line squadrons on mobilisation, as is the case with the R.A.F. Reserve.

An aircraft carrier is about to be equipped, and £250,000 has been voted for the purchase of ship-planes and accessories.

SOUTH AFRICA

The South African Air Force is less developed than those of Canada and Australia. The Director of Air Services (Sir Pierre Van Ryneveld, K.B.E., D.S.O., M.C.) is a member of the Military Board of the Union, and so the air force is definitely under military control. But that is not to say that

as the importance of the air becomes more clearly recognised in South Africa (which will probably happen through the influence of civil flying in the near future) the South African Air Force will never attain an independent status. As it is, it is the only Dominion air force which has seen something like active service since the Armistice, both in the Johannesburg rebellion and in dealing with some recalcitrant Hottentot tribes.

Like other air forces, it is partly regular and partly citizen in its personnel. There are about 30 regular officers and from 200 to 300 regular airmen. The citizen officers number about 45.

The organisation is in a fluid state. There is what might be described as a double squadron, stationed at Roberts Heights, near Pretoria, using "Gift" aeroplanes presented to the Union by the Government of Great Britain after the Armistice. The machines include Avros, S.E.5A's, D.H.9's and D.H.4's, which are used as required. About 18 months ago the force operated a mail service between Cape Town and Durban for the Government, as an experiment. Technically it was a great success, but it was not well supported by the business community.

The strength on mobilisation would probably be two squadrons = 24 machines.

NEW ZEALAND

The air service of New Zealand is in quite an embryonic state. Apparently it is counted as part of the military citizen force, some men when called up for service preferring to learn to fly rather than to drill as infantry. The regular personnel consists of five officers and 14 airmen, and there are 101 citizen officers. The Dominion Government has acquired Wigram aerodrome, outside Christchurch, for the force. It is believed, however, that the Dominion Government was impressed by what was laid before it at the Imperial Conference, and that developments may be looked for shortly. It is not unlikely that the final stimulus will be provided by the forthcoming voyages of the new large airships now building.

IRISH FREE STATE

In the Irish Free State there is an Army Air Corps, consisting of one squadron stationed at Baldonnel, Clondalkin, not far from Dublin. There are under 20 officers, and they possess a mixed fleet of 30 aeroplanes—Avros, Bristol Fighters, D.H.9's, Martinsydes, and four Moths. During the rebellion of the republicans this squadron did some useful army co-operation work. It is impossible to prophesy whether the I.F.S. will ever institute an independent air force. At present, the squadron is definitely military, and, while it may be counted as "air effort," it adds nothing to the "air power" of the Empire.

THE RESIDUE OF THE ROYAL AIR FORCE

If one considers "air effort" as apart from "air power," one must make brief allusion to the army co-operation squadrons, the fleet air arm, and training schools where flying takes place.

The army air arm consists of four squadrons all using Bristol Fighters, namely,

- No. 2 at Manston.
- No. 4 at South Farnborough.
- No. 13 at Andover.
- No. 16 at Old Sarum.
- Total 48 machines.

No. 13 has been selected to try out the Atlas-Jaguar as a possible alternative to the Bristol Fighter, and a number of Atlas machines will be put on its charge in the near future. These will not, of course, add to its permanent establishment.

The fleet air arm is divided between the Coastal Area and the Mediterranean Command of the Royal Air Force, and the China station of the Royal Navy. The Coastal Reconnaissance Flight (No. 480) has been included in the total for

air power above. It will be convenient to disregard the temporary dislocation caused by the trouble in China, and to show the flights in their recent organisation.

Coastal Area

Leuchars: No. 442 Fleet Reconnaissance Flight. (Fairey 3 D.)

Donibristle: No. 404 Fleet Fighter Flight. (Flycatcher.) No. 406 Fleet Fighter Flight. (Flycatcher.)

Gosport: No. 422 Fleet Spotter Flight. (Blackburn.)

Mediterranean Command. Malta: No. 481 Coastal Reconnaissance Flight. (Fairey 3 D.) (N.B. This flight is not included in the Fleet Air Arm.)

H.M.S. Furious: No. 443 Fleet Reconnaissance Flight. (Fairey 3 D.) No. 405 Fleet Fighter Flight. (Flycatcher.) No. 420 Fleet Spotter Flight. (Blackburn.) No. 421 Fleet Spotter Flight. (Bison.) No. 461 Fleet Torpedo Flight. (Dart.) No. 462 Fleet Torpedo Flight. (Dart.)

H.M.S. Hermes. Mediterranean: No. 403 Fleet Fighter Flight. (Flycatcher.) No. 440 Fleet Reconnaissance Flight. (Fairey 3 D.)

H.M.S. Eagle. Mediterranean: No. 402 Fleet Fighter Flight. (Flycatcher.) No. 423 Fleet Spotter Flight. (Bison.) No. 441 Fleet Reconnaissance Flight. (Fairey 3 D.) No. 460 Fleet Torpedo Flight. (Dart.)

H.M.S. Vindictive. China Station: No. 401 Fleet Fighter Flight. (Flycatcher.) No. 444 Fleet Reconnaissance Flight. (Fairey 3 D.)

H.M.S. Argus has just been recommissioned and has proceeded to China. Nos. 406, 442, and parts of 404 and 443 flights have been transferred to her, but this makes no difference to the strength of the fleet air arm. The above list shows 18 fleet flights and one coastal reconnaissance flight which gives a machine strength of 114.

Training and Development Units

Training and development units add nothing to the machine strength of any fighting force, but we may perhaps merely enumerate the following:—

Inland Area:—

- Central Flying School, Wittering, near Wansford, Northampton.
- No. 1 Flying Training School, Netheravon.
- No. 2 Flying Training School, Digby, Lincolnshire.
- No. 5 Flying Training School, Sealand, Cheshire.
- School of Army Co-operation, Old Sarum.
- Royal Aircraft Establishment, S. Farnborough.
- Aeroplane and Armament Experimental Establishment, Martlesham Heath.

Coastal Area:—

- School of Naval Co-operation, Lee-on-Solent.
- A (Fighter) Training Flight, Leuchars.
- B (Spotter) Training Flight, Leuchars.
- C (Reconnaissance) Training Flight, Leuchars.
- D (Torpedo) Training Flight, Gosport.
- Flying Boat Development Flight, Felixstowe.
- High Speed Flight, Felixstowe.
- Marine Aircraft Experimental Establishment, Felixstowe.
- Headquarters Training Squadron, Calshot.
- Seaplane Training Flight, Calshot.
- Development Flight, Gosport.

Middle East:—

- No. 4 Flying Training School, Abu Sueir.

Cranwell and Halton:—

Flying training is also carried out at the Royal Air Force Cadet College, Cranwell, and at the School of Technical Training (Apprentices) at Halton.

Civil Flying Schools:—

Flying training for the R.A.F. Reserve is carried out at the De Havilland School, Edgware, the Bristol School, at Filton, the Armstrong-Whitworth School at Coventry, the Beardmore School at Renfrew, and the Blackburn School at Brough.



FLYING EQUIPMENT OF THE BRITISH AIR FORCES

On the following pages we have collected illustrations and brief descriptions of the types of machines in use by the air forces at home and in the Dominions. In order to facilitate reference the machines have been grouped according to whether they are in actual use by service squadrons, or merely experimental. The first section or group relates to types of machines which are standard equipment and in regular use, while the second deals with experimental types, or types about to go into production as standardised machines.

Within this general grouping the machines are again subdivided according to class, *i.e.*, into bombers, fighters, troop-carriers, etc., and against each machine will be found classification letters having the following significance:—B: Bomber; F: Fighter; A.C.O.: Army Co-operation; R.: Reconnaissance; T.C.: Troop-Carrier; T.: Training. In the bomber class no distinction has been made, as regards classification letters, between single-engined and twin-engined bombers, as the difference will be obvious from the text and illustrations.

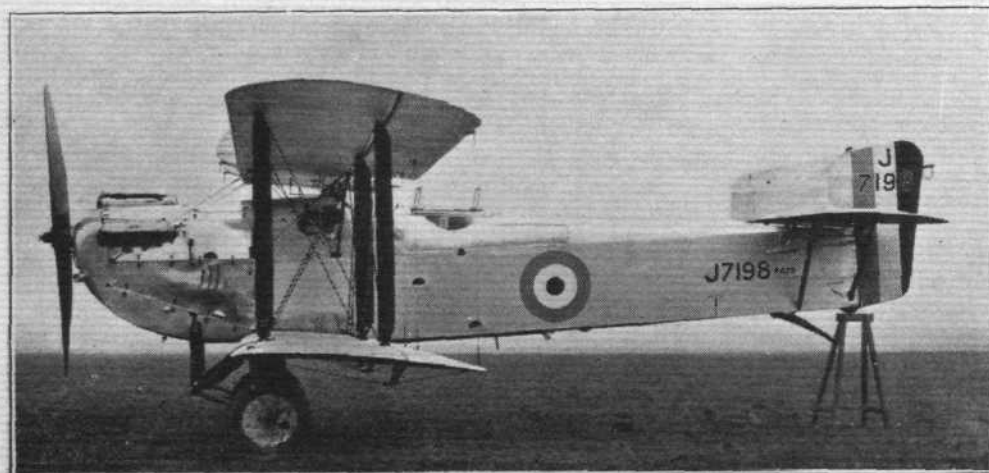
(B.) De Havilland D.H. 9a "Liberty" Engine

This is a hardy war-type that has passed through various modifications right up to the present day, and is still doing service with several of the bombing squadrons. Large quantities of this type have been produced, and it is too well known to need further reference here. The Bombing Squadrons equipped with D.H.9a's are:—Nos. 8 (Iraq); 14 (Amman and Ramleh); 24 (Communications, Kenley); 27 (Risalpur); 30 (Iraq); 39 (Spittlegate); 47 (Mid. East); 55 (Iraq); 60 (Kohat); 84 (Iraq); 207 (Eastchurch); 600 (A.A.F. Northolt); 601 (A.A.F. Northolt); 602 (A.A.F. Renfrew); 603 (A.A.F. Turnhouse); 605 (A.A.F. Castle Bromwich).



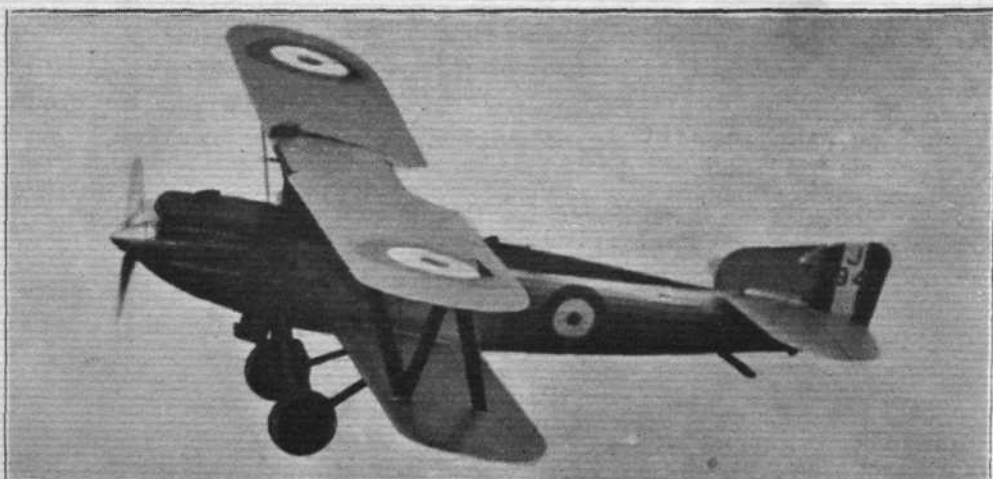
(B.) Fairey "Fawn" Napier "Lion"

In the Fairey "Fawn" we have what may be styled the modernised version of the famous "111 D" seaplane—still in use for Fleet Reconnaissance work—but designed as a two-seater long-distance day bomber. Strictly speaking, however, this similarity is confined to general appearance, for it differs from the 111 D in several respects. Its distinctive features include the well-known Fairey patented flap gear and a special Oleo undercarriage. At present only two of our bombing squadrons are equipped with "Fawns," as follows:—No. 11 (Netheravon, and No. 503 (Special Reserve) Waddington.



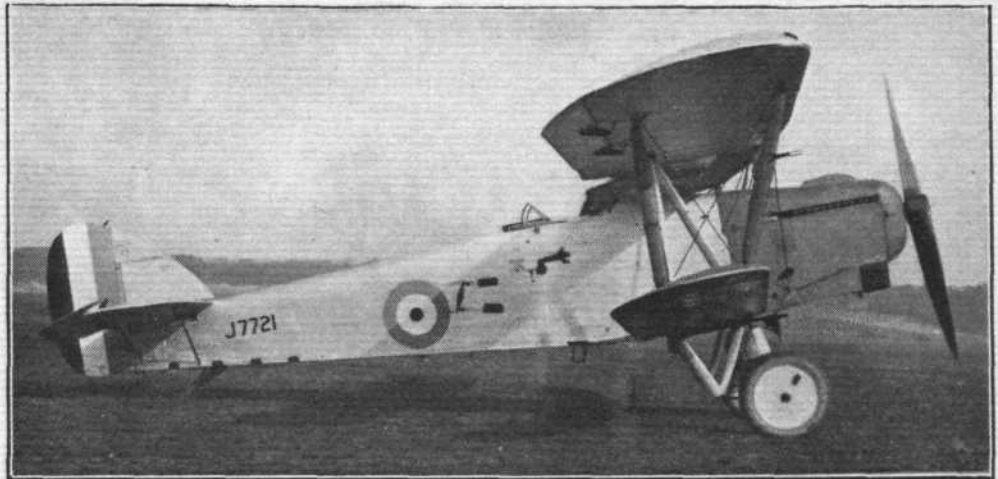
(B.) Fairey "Fox" Fairey "Felix"

The Fairey "Fox"—which, incidentally, is entirely of original design, evolved by the Fairey Aviation Co. independently of Air Ministry specifications—is a recent two-seater day bomber fitted with a Fairey "Felix" engine. It is, perhaps, one of the fastest machines of its type in the world, which is not surprising when one observes its exceptionally clean lines, and absence of all excrescences which might add head resistance—even the usual external Scarff gun ring has been eliminated. The "Fox" is now used by No. 12 (Bombing) Squadron, Andover.



(B) Hawker "Horsley"
Rolls-Royce "Condor"

THE Hawker "Horsley" is another modern conception of the day bombing machine, but differing from the "Fox" in several respects. In the first place, it is a much larger machine, and is fitted with a more powerful engine—the Rolls-Royce "Condor." Secondly, it was designed specially to Air Ministry specification—complete with "gadgets," external and otherwise. It has, nevertheless, an exceptionally fine performance, which has resulted in its being put into production, two Bombing Squadrons already being equipped with it, viz., No. 15, Martlesham, and No. 100, Spittlegate.

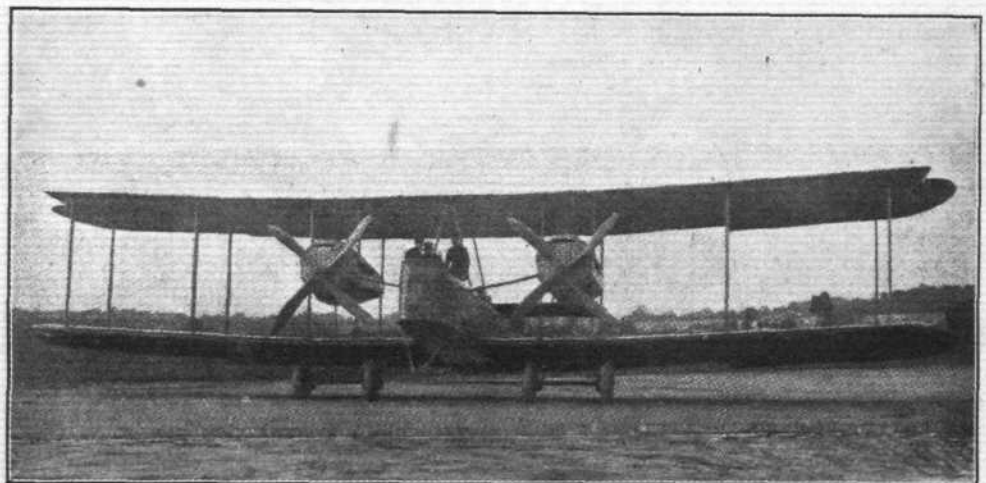


(B) Handley Page "Hyderabad"
Two Napier "Lions"

This four-seater medium-range bomber is a development for Service purposes from the Handley Page commercial machines which originated with the famous O-400. The principal change is in the fuselage design, which now accommodates the crew in tandem, with a gunner in the nose, and the pilot in a raised position just aft of him. Further gun positions are aft, at the top and bottom of the fuselage. The petrol tanks are beneath the top plane, and supply petrol by gravity feed to the engines. "Hyderabad" are used by Squadron No. 99 (Bombing), Bircham Newton, Norfolk.

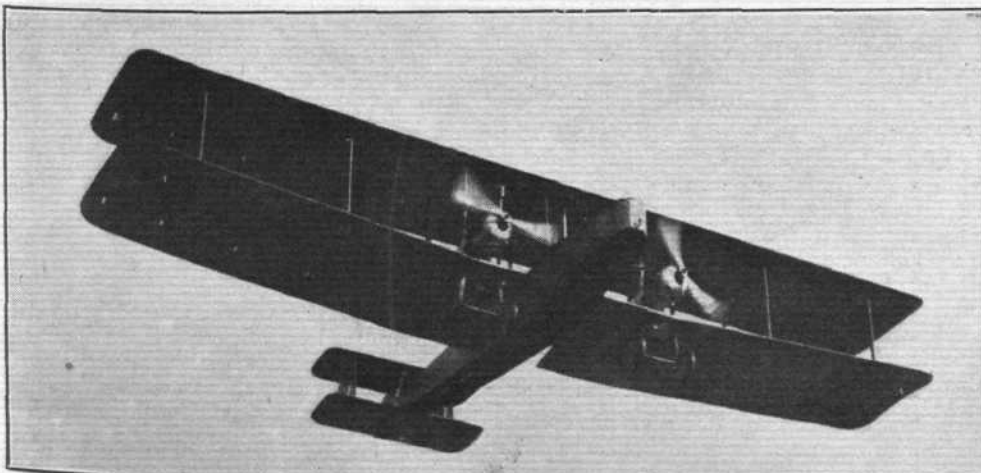
(B) Vickers "Vimy"
Two Rolls-Royce "Eagles"

THE Vickers "Vimy" is another of the Service Veterans which must surely be approaching the end of its long career of good work with the R.A.F. The original "Vimy" was produced in 1917, after which several models made their appearance, each an improvement on the other. The end of the Great War came, however, before the "Vimy" could carry out a series of big raids into the enemy country, as planned and show what it could do. However, after the Armistice it was put into production for service with bombing squadrons. At present only No. 502 Special Reserve Squadron (Aldergrove) has "Vimys."



(B) Vickers "Virginia"
Two Napier "Lions"

THIS long-distance bomber comes from a famous ancestor, the "Vimy," on which the late Sir John Alcock and Sir Arthur Whitten Brown flew the Atlantic, and Sir Ross Smith, with his brother Sir Keith Smith, flew to Australia. It is, however, much larger, and is fitted with more powerful engines, and has a duration of 13 hours at a speed of 85 m.p.h. It forms the equipment of bombing squadrons, No. 7, Bircham Newton; No. 9, Manston; and No. 58, Worthy Down.





"Armstrong Whitworth Siskin"
(F) *Armstrong Siddeley "Jaguar"*

This is a successful single-seater fighter that has passed through several series types. It is a single-bay tractor fuselage biplane, in which the top plane is very much larger than the lower plane. The fuselage—and in some cases the wings also—is of metal construction, while a special Oleo undercarriage is fitted. The "Civil" version of the Siskin is well known to *FLIGHT* readers in connection with various racing events. The following squadrons are equipped with this machine: No. 41 (Fighter) Northolt and No. 111 (Fighter) Duxford.

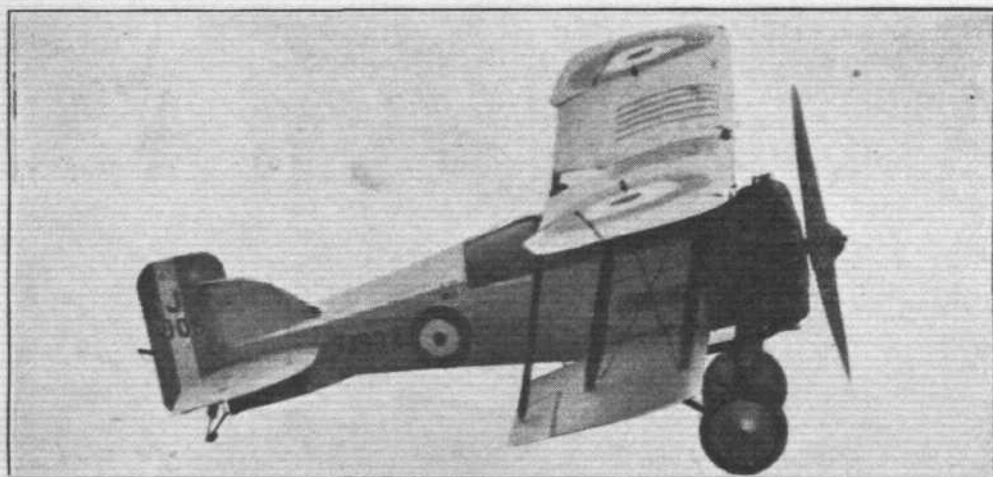
(F) **Gloucester "Grebe"**
Armstrong Siddeley "Jaguar"

The "Grebe" is now being superseded by the "Gamecock" as the popular single-seater fighter in the R.A.F., although large numbers are still used. It has a fairly thick wing section high-lift top plane and a thin-section low-lift bottom plane, and it is claimed that at top speed the upper wing bears nearly the whole load, thus approaching monoplane efficiency. The "Grebe" is used with the following squadrons:—No. 19 (Fighter), Duxford; No. 25 (Fighter), Hawkinge; No. 29 (Fighter) Duxford; No. 32 (Fighter), Kenley; and No. 56 (Fighter), Biggin Hill.



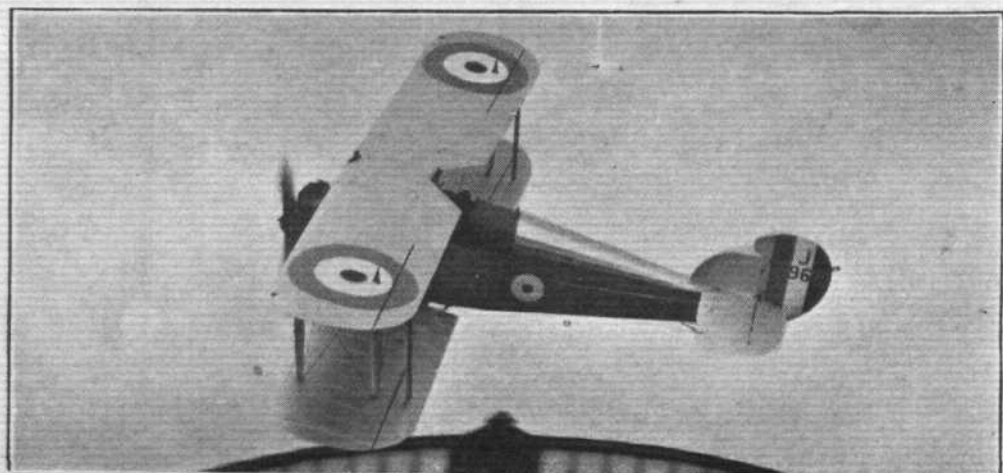
(F) **Gloucester "Gamecock"**
Bristol "Jupiter"

This machine is very much like the "Grebe" in general appearance, although it actually incorporates a number of improvements and special features of which we cannot give details here. It is remarkable for the easy accessibility of its various equipment, which is of the greatest importance for Service purposes. Its engine is of the type which successfully passed a test of 25,000 miles' running during a succession of flights between Croydon and Bristol. The squadrons equipped with "Gamecocks" are No. 23 (Fighter), Henlow, Beds; No. 32 (Fighter), Kenley, Surrey; and No. 43 (Fighter), Tangmere, Sussex.



(F) **Hawker "Woodcock"**
Bristol "Jupiter"

This single-seater fighter may be said to have "ascended" from a large family which commenced with the birth of the little Sopwith "Tabloid," built just before the war by the parent company of the H. G. Hawker Engineering Co. It is of a normal, conventional design, but, as is often the case with other machines, its appearance is deceptive and conceals abilities not easily observed. It is at present the standard equipment of two Fighter Squadrons, as follows:—No. 3, Upavon, and No. 17, also Upavon.



MARCH 10, 1927

FLIGHT
THE LONDON AIRCRAFT

(A.C.O.) **Armstrong Whitworth
"Atlas"**

Armstrong Siddeley "Jaguar"

The Armstrong Whitworth "Atlas" might be described as a near relation of the famous "Siskin" family, to which it bears a strong resemblance, although it is a two-seater designed for Army co-operation work. It is one of the several types of this class of machine recently produced at the request of the Air Ministry, as the time must soon be approaching when the present machine in use—the Bristol Fighter—will have to be replaced by up-to-date equipment. A number of "Atlas" "Co-ops" have therefore been put into service with No. 13 Squadron, Andover.



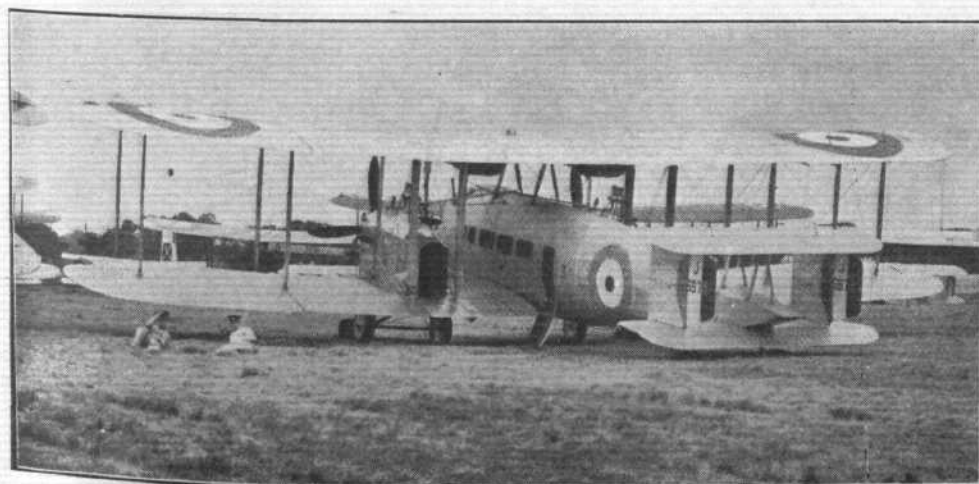
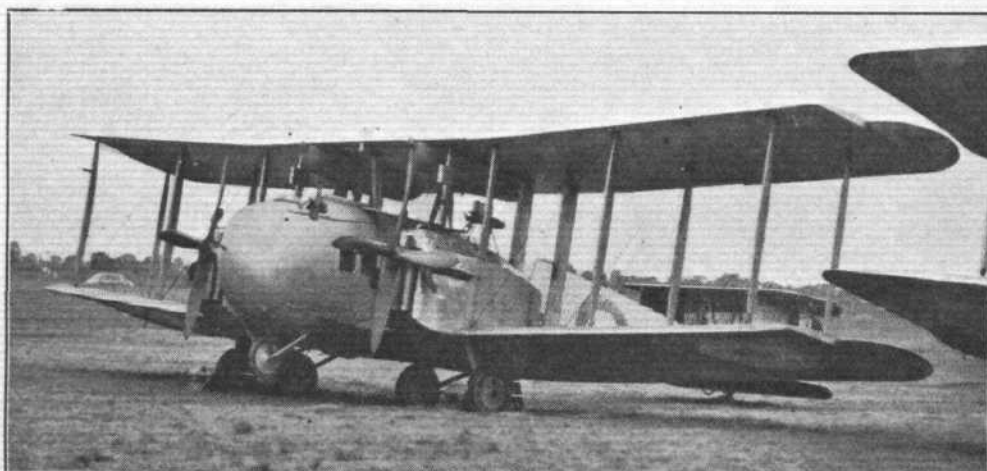
(A.C.O.) **Bristol Fighter
Rolls-Royce "Falcon"**

The Bristol Fighter is one of the hardy war veterans, and as a fighter made a name for itself during the Great War, when it was produced in large numbers. It is still in regular Service use exclusively for Army Co-operation. With some ten years of service already to its credit, it is probable that this type may shortly be replaced by modern designs. The following squadrons (Army Co-op.) are equipped with "Bris-Fits":—Nos. 2 (Manston), 4 (S. Farnboro'), 5 (Risalpur, India), 6 (Iraq, Mosul), 13 (Andover), 16 (Old Sarum), 20 (Peshawar, India), 24 (Communications, Kenley), 28 (Quetta, India), 31 (Ambala, India), and 208 (Middle East).

(T.C.) **Vickers "Vernon"**

Two Napier "Lions"

The Vickers "Vernon" is a development of the famous "Vimy" and its commercial version, which latter has been in service on the London-Continental air routes of Imperial Airways. It is a twin-engined biplane with a large circular section fuselage forming, in the forward half, a roomy cabin with side windows. The pilot's cockpit is located high up in the nose of the fuselage. It is employed mainly as a troop transport, or as an aerial ambulance, in the Middle East, No. 45 Squadron being thus equipped.



(T.C.) **Vickers "Victoria"**

Two Napier "Lions"

The Vickers "Victoria" is, as will be seen from our illustration herewith, an enlarged version of the "Vernon," to which we have just referred. The general design is the same and it is also fitted with two Napier "Lions." Its overall dimensions, however, are much larger; the span being 86 ft. 6 ins. as against 68 ft., and the overall length 51 ft. 7 ins. instead of 43 ft. 8 ins. The carrying capacity of the "Victoria" is, therefore much greater, viz., two pilots plus 23, as against a total of 12 in the "Vernon." It is also used for troop carrying, No. 70 Squadron (Iraq) being equipped with this 'bus.



(T.) Avro 504 K

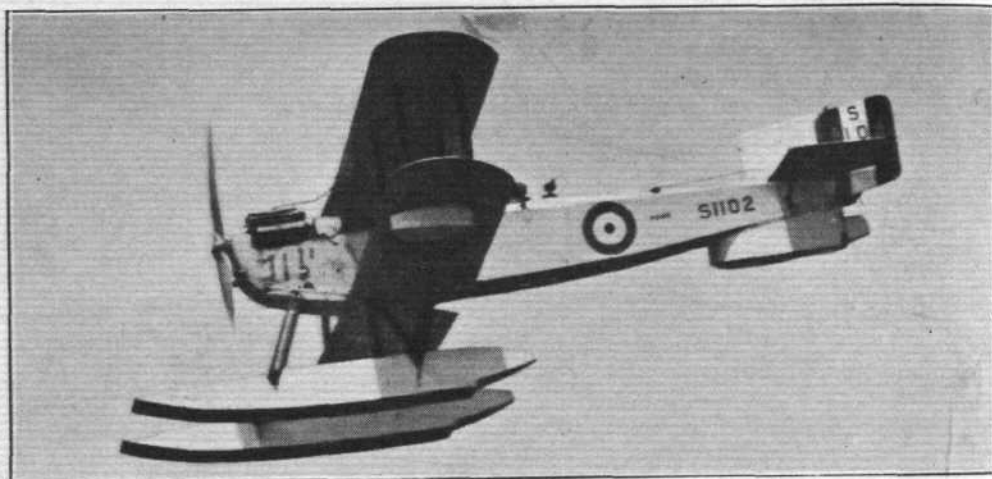
Siddeley "Lynx" and various Rotary Engines

"Old Avros never die, but always fly away" should become the popular "flying" song of the R.A.F. First designed in 1912, the Avro type 504 is still largely used in the Service—of course, considerably modified, but fundamentally the same. Various types of rotary engines are installed, and recently the Siddeley "Lynx" has been fitted with successful results. The squadrons equipped with Avro 504 K's are:—Nos. 24 (Communications), 502 (S.R. Ulster), 503 (S.R. Waddington), 600, 601 (A.A.F. Northolt), 602 (A.A.F. Renfrew), 603 (A.A.F. Turnhouse), 605 (A.A.F. Castle Bromwich).

(Fl.R.) Fairey 111D

Napier "Lion"

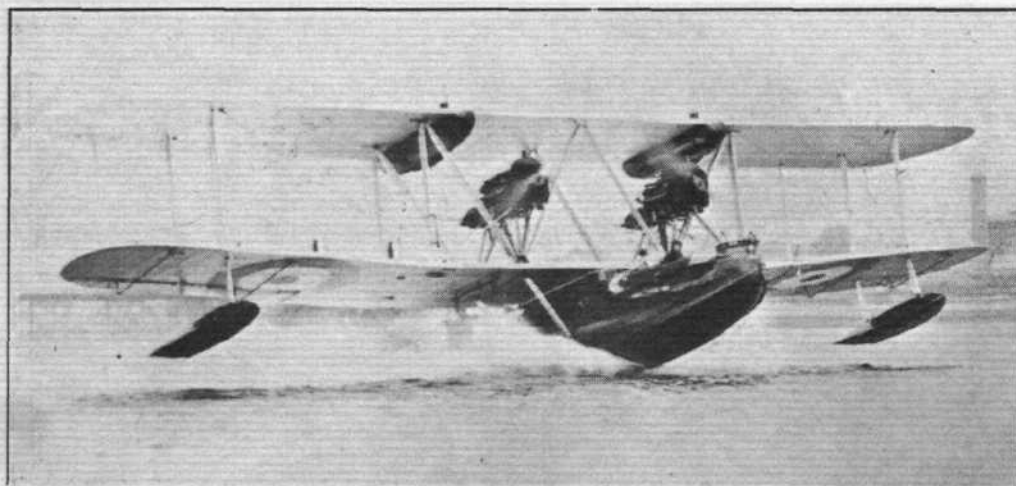
This Fairey seaplane type has long been used for work with the Fleet, and it also has a considerable record of fine flights. One in particular that is familiar being the R.A.F. flight from Cairo to the Cape, the return to Cairo and then on to England. The 111D is adaptable to both seaplane and land 'plane service. It may, perhaps, be regarded as one of the standard seaplane types for its specific purpose, *i.e.*, fleet reconnaissance work. It is used by No. 440 Flight (H.M.S. Hermes), No. 441 (H.M.S. Eagle), No. 442 (Leuchars), No. 443 (H.M.S. Furious), No. 444 (H.M.S. Vindictive), and No. 481 (Malta).



(Fl.R.) Supermarine
"Southampton"

Two Napier "Lion" engines

One of the remarkable facts about the "Southampton" was that it was designed and constructed in 7½ months and immediately went through its official tests without a hitch, and then became a standard type to the R.A.F. Hardly were they in Service use when they undertook a cruise round the British Isles, and were officially praised for their performance. The "Southampton" carries no petrol in the hull, the main tanks being supported under the top 'planes, which gives unusual freedom for the crew in the hull, and even space to sling hammocks. (Attached to Coastal Area.



(Fl.S.) Avro "Bison"

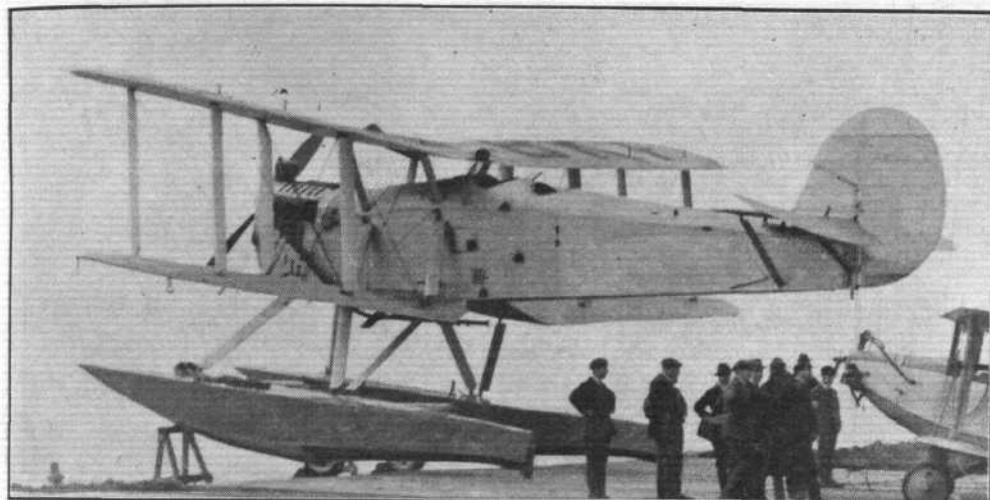
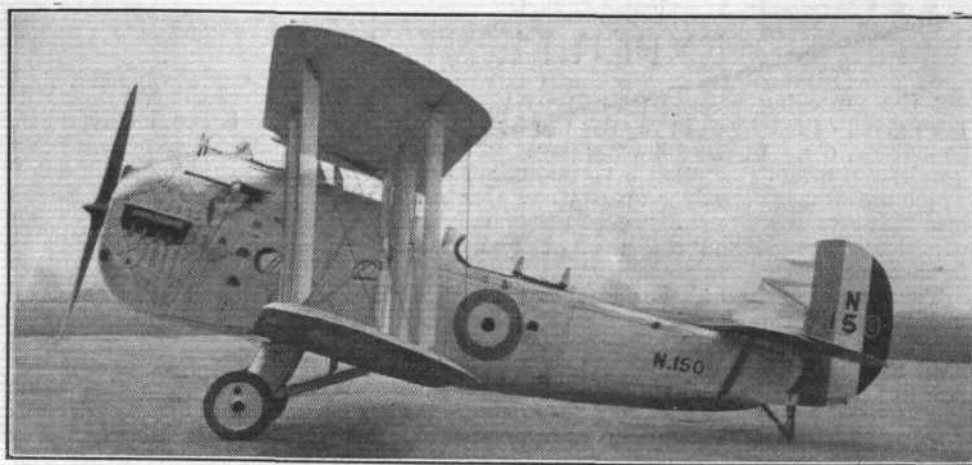
Napier "Lion"

The Avro "Bison" is a remarkable example of the versatility of the designing powers of a single firm, which has been responsible for such a variety of types as the Avro 504 K, the "Avenger" single-seater fighter and the "Ava" bomber. The "Bison" is a four-seater Fleet gunnery spotter. It has a deep fuselage forming a cabin for the crew, while the pilot sits high up in front of the top plane. In spite of its size its landing speed is low enough to permit safe landing on the deck of an aircraft carrier. "Bisons" are attached to H.M.S. *Furious* and *Eagle*.



(Fl.S.) **Blackburn "Blackburn II"**
Napier "Lion"

THE "Blackburn" is a three-seater fleetspotter machine, and a product that followed the "Dart." It has a very deep fuselage in the front half, and although it has the same type of engine as the "Dart," the nose has not the same clean lines of the latter owing to the position of the pilot, who has a splendid range from a cockpit almost immediately above the engine and level with the top wing. The wings and tail unit resemble very closely the "Dart's." It is used by Flights No. 420 (H.M.S. *Furious*) and No. 422 (Gosport). Incidentally, it is named after the town of Blackburn.

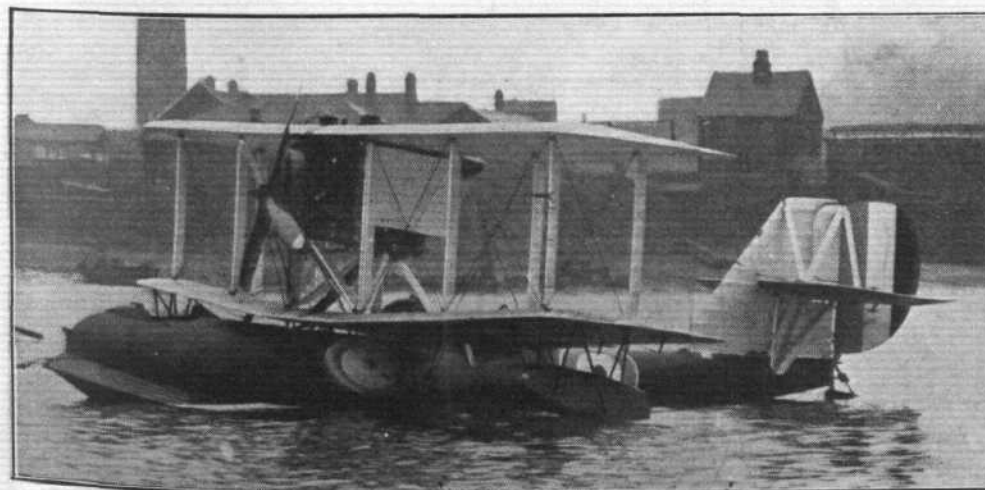


(Fl.T.) **Blackburn "Dart"**
Napier "Lion"

THIS torpedo plane, designed for deck landing, is more or less a modification of the early "Swift," and has been constructed as a single-seater and two-seater. It is of steel structure, with the exception of the wings, with main joints of the spool type. The sharp downward sweep of the top of the fuselage to the engine cowling allows a very clear view. When it was originally designed many foreign countries purchased a few for experimental purposes, and it was made under licence in France by a well-known French firm. It is used by Flights No. 461 (H.M.S. *Furious*); No. 462 (H.M.S. *Furious*); and No. 460 (H.M.S. *Eagle*).

(Fl.F.) **Fairey "Flycatcher"**
Armstrong Siddeley "Jaguar"
or Bristol "Jupiter"

Nominally a single-seater fighter, the "Flycatcher" is adaptable for many rôles. Its "cocked-up" fuselage arises from the necessity for a large ground angle, used in conjunction with the Fairey patented flap gear, which makes for slow landings with heavy loading. It functions as a ship's plane for naval co-operation, and is also produced as a twin-float seaplane, a design which makes it amphibian, too, for landing wheels project through the centre of the floats. It is used with Fleet Fighter Flights Nos. 401, 402, 403, 404, 405 and 406, on aircraft carriers and at coastal bases.



(Fl.R.) **Supermarine "Seagull"**
Napier "Lion"

THE Supermarine "Seagull" is an amphibian-flying boat designed for fleet spotting and reconnaissance. The first of its type was produced in 1921, and it has passed through several series types. While the "Seagull" does not form the standard equipment of any of our home forces, a number are in service with the Royal Australian Air Force, and we have, therefore, included it amongst our résumé of types. The "Seagull" has an excellent all-round performance, with a sufficiently low-landing speed to allow of deck-landing. The landing wheels are of the retractable type, folding up under the wings.

EXPERIMENTAL TYPES OF AIRCRAFT

ON the preceding pages particulars and illustrations have been given of machines in regular use by the various R.A.F. squadrons, etc. In the following pages will be found photographs and brief descriptions of a number of types of aircraft which are either in the experimental stage, or have just passed into that intermediate stage which exists between the original experimental type and the modified type standardised for Service use.

Thus a number of the machines dealt with in the following pages may never get beyond the experimental stage, while others will in time come to be recognised as standard Service types. We should have liked to be able to point out, in the case of each type, into which of these two categories the machine falls, but for various reasons this has not been possible, partly because in many cases no decision has been taken yet, and partly because it is one of the rules

of the Air Ministry that until a type is actually in production it is officially regarded as experimental.

It is not claimed that every type of experimental aircraft is included in the following pages, since a large number are in existence which may not be described nor illustrated, nor even mentioned, while other types were regarded as experimental a few months ago, but no longer come into consideration. For classification purposes each of the following aircraft has been given classification letters, the significance of which is as follows:—Bomber: B; Fighter: F; Army Co-operation: AC-O; Reconnaissance: R; Troop-carrier: TC; Training: T.

In the case of machines operating with the Fleet Air Arm the letters Fl. precede the usual classification letter thus: Fleet and Coastal Reconnaissance: Fl. R; Torpedo-carrier: Fl. To.; Fleet Spotter: Fl. S; Fleet Fighter: Fl. F.

(B) Avro "Ava"

Two Rolls-Royce "Condors"

The Avro "Ava" is one of the most powerful machines of its class. It is a twin-engined coastal defence torpedo aircraft, with a total of 1,340 h.p. It is capable of very long range and the pilot's cockpit provides for side-by-side seating and is fitted with dual control. The usual gunner's positions are provided, and the separated undercarriage allows for the carrying and releasing of the torpedo, whilst there is an alternative arrangement for a bomb load. The wings fold back and the machine, despite its size, can then be accommodated in an ordinary hangar.



(B) Bristol "Berkeley"

Rolls-Royce "Condor"

This is a day-bomber fitted, like the "Horsley," with Rolls-Royce "Condor" engine. It is an all-metal design with novel forms of steel construction for the main members and Duralumin for the minor parts. The clean lines will be noticed. The wings are of equal span and chord, and there is a very wide wheelbase with no centre axle. It is claimed that the Bristol-Frise patented balanced ailerons introduce no yaw to interfere with the sighting range of the bomber. The pilot has a fine view from his cockpit ahead of the wings.



(B) Boulton and Paul "Bugle"

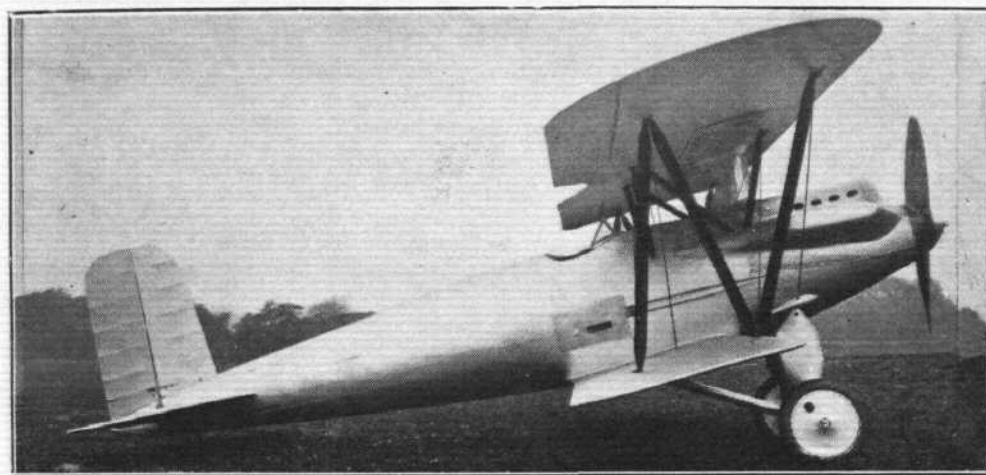
Bristol "Jupiters"

This is one of the usual high-performance twin-engine machines of the famous Norwich firm, and bears a resemblance to the first of the series, the "Bourges," but is of all-metal construction, of course. The "Jupiter" engines are mounted on tubular structures between the wings and, as usual, the lower wing has a smaller chord than the top wing. A crew of three is carried besides the armament, and the machine has a long cruising range, and is remarkable for its manoeuvrability.

MARCH 10, 1927

FLIGHT
THE AERIAL ENGINEER
(B.) Westland "Yeovil"*Rolls-Royce "Condor"*

Here we have another designer's conception of the day bomber fitted with the Rolls-Royce "Condor," like the "Horsley" and "Berkeley." A feature of this machine is the high-lift section gravity tanks. The nose slopes from the pilot's cockpit, and gives him a good view, while the rear gunner is clear of the wings, and has a wide range for firing, as well as a clear view downwards for bombing. The 600 h.p. engine is fitted with a Leitner-Watts metal propeller. There is a forward-firing gun, and two firing aft. The chassis is fitted with oleo shock absorbers.

**(F.) Avro "Avenger"***Napier "Lion" VIII*

This single-seater fighter, evolved last year by the same designer of the "Ava," shows the versatility and ability that is expected of the aircraft designer. It has a monocoque fuselage, beautifully streamlined, into which the cylinder blocks are very neatly faired. Its clean lines and slim appearance suggest very obviously its speed and a performance suitable for its purpose. A notable aspect of the design is the tall, almost oblong, rudder and fin, whilst the neat and simple undercarriage is another feature. It is fitted with Lamblin wing-type radiators on the top plane.

(F.) De Havilland "Dingo"*Bristol "Jupiter" or Siddeley "Jaguar."*

The De Havilland "Dingo," or D.H.42, is one of the recent experimental productions of the de Havilland firm, built to Air Ministry specification. Bearing the typical "D.H." stamp, but embodying several distinctive features, the "Dingo" was designed as a two-seater fighter of the tractor fuselage biplane type. It can be fitted either with the Bristol "Jupiter" or the Siddeley "Jaguar" engine. The top plane has a slightly larger chord than has the lower one—a novelty in D.H. design—and the pilot sits immediately below it, a circular hole being cut in the centre to provide upward vision.

**(F.) Fairey "Firefly"***Fairey "Felix"*

The "Firefly" is a single-seater fighter of quite exceptionally clean design, with a fuselage of streamline form and small cross-sectional area, wing radiators and very simple undercarriage. The small overall width of the engine and the absence of a nose radiator enables the front portion of the fuselage to be practically free of "bulges," thereby eliminating much air resistance. The lines of the nose are swept neatly to a point capped by a small spinner over the boss of the Fairey-Reed Duralumin propeller.

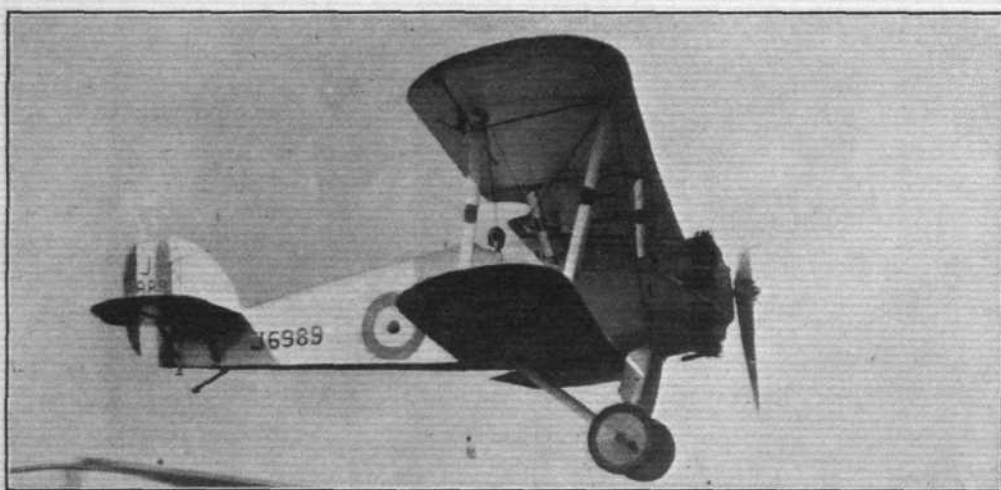


(F.) Gloucester "Gorcock"
Napier "Lion" VIII

As a single-seater fighter with a Napier direct-drive engine, the "Gorcock" may be compared with the Avro "Avenger." There is one difference, in that the radiator of the "Gorcock" is of type mounted below the fuselage between the landing chassis struts, whilst the "Avenger" has a Lamblin wing radiator. Its very close resemblance to all Gloucester designs will be easily noticed. This prompts one to reflect that all the Gloucester types are remarkably similar in appearance; a fact that can be attributed to other designers too, but perhaps not so strongly.

(F.) Hawker "Hornbill"
Rolls-Royce "Condor"

Here we have another single-seater fighter, but somewhat different to the others. It has a larger engine, which means a greater quantity of fuel to be carried with a corresponding increase in weight, and a larger wing area, if the same stalling speed is to be retained. In spite of these considerations, the "Hornbill" is a successful production of its type, and has to suffer no sacrifice in speed. The engine cowling is very neatly effected.



(F.) Hawker "Heron"
Bristol "Jupiter"

The "Heron" designed and constructed by the H. G. Hawker Engineering Co., is an experimental high performance single-seater fighter, embodying a number of important features in detail design. It may be described as a development of the "Woodcock" single-seater fighter, constructed by the same firm, already in service production. It is a tractor biplane of the single-bay type, with a large top plane and a smaller lower one. It has an excellent performance, especially as regards climb, and its manœuvrability is also good.

(A.C.O.) Bristol "Boarhound"
Bristol "Jupiter"

The Bristol "Boarhound" is Capt. F. S. Barnwell's conception of the modern machine intended for Army co-operation purposes—which duty is at present efficiently performed by an early design of Capt. Barnwell's, the Bristol Fighter. While the "Boarhound" bears little resemblance to the latter, the individuality of the designer is at once apparent. The pronounced stagger will be noticed, and the higher position of the pilot's and gunner's cockpits to give them a good view. The former's guns are enclosed in tunnels on the side of the fuselage to reduce their air resistance as much as possible.



(A.C.O.) De Havilland
"Hyena"

Armstrong Siddeley "Jaguar"

This is another experimental Army co-operation type, but it clearly retains typical de Havilland lines, and in particular it obviously resembles the famous D.H.9A. The differences from the latter are the change over from a water-cooled "Liberty" to a radial air-cooled engine, and the fitting of a lower plane of smaller chord than the top. The undercarriage is a more modern design, too, having rubber blocks working in compression. The cowl- ing of the "Jaguar," it will be noticed, is an exceptionally neat job.



(A.C.O.) Vickers "Vespa"
 Bristol "Jupiter"

This machine is one of the four new Army co-operation types, and was designed by Mr. Rex Pierson. Its large wing area will be noted, which enables very slow flight—a desirable feature for an Army co-operation machine. A rather unusual aspect of its design is the bottom wing being considerably lower than the fuselage, and consequently near to the ground. The wings are of unequal span and chord, and the fuselage is of relatively small cross-sectional area.



(R.) De Havilland "Stag"
 Bristol "Jupiter VI"

Fitted with the 450 h.p. Mark VI Bristol "Jupiter" engine, the D.H. "Stag" has an exceedingly good performance, and may be described as a general-purpose military two-seater tractor biplane, being particularly suitable for reconnaissance work, and also for Army co-operation, bombing, photography, etc. It has a range of five or six hours' duration. The "Stag" is generally similar to the D.H.9; in fact, it may be said that aft of the main planes it is standard D.H.9 practice, the rest being new.



(R.) Fairey III F
 Napier "Lion"

We regret that we have been unable to obtain a photograph of the Fairey III F, a recent type constructed for the Air Ministry by the Fairey Aviation Co. Neither is it possible for us to publish any details of this machine, but one gathers that it is a development of the famous III D and is intended for general service. We believe that it is on this type that the forthcoming R.A.F. flight from Cairo to Cape Town will be made.

No Photograph Available

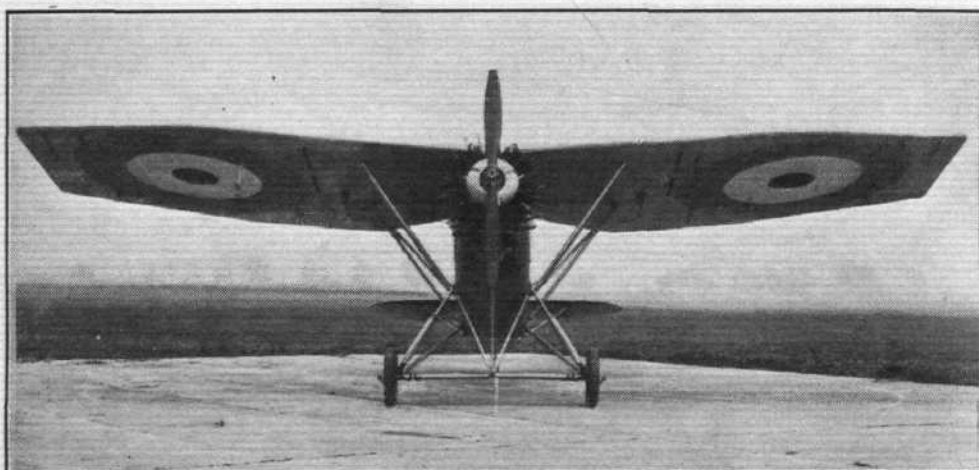


(R.) Short "Chamois"
Bristol "Jupiter"

The Short "Chamois" is a development of the "Springbok," produced for the Air Ministry a little while back by Short Bros., of Rochester. Unfortunately, no photograph of the "Chamois" was available in time for publication here, but we show in the accompanying illustration the "Springbok," which is very similar in general appearance to the "Chamois," differing only in minor details. This series was designed as two-seater reconnaissance (corps) of fighter, in which metal construction was largely employed.

(Fl.R.) Blackburn "Airedale."
Siddley "Jaguar"

This three-seater reconnaissance machine is the first and only monoplane design of the Blackburn firm in post-war industry. It has a very thick wing section and in plan view it tapers towards the centre and also towards the wing tips, which are squared off. The wing not only folds back but it folds round the monocoque fuselage, i.e., flat on instead of edge on. It is a wooden production with box spars, dual control, the first pilot being high in the nose, and the second pilot aft of the wing with the gunner behind him. The control columns are of inverted U-shape swinging from base attachments one each side of the fuselage.



(Fl.R.) Blackburn "Iris"
Three Rolls-Royce "Condors"

One of the latest products of the Blackburn Aeroplane and Motor Co., Ltd., is the large three-engined flying-boat "Iris." This firm has only produced a flying-boat type once before (i.e., the Schneider Cup "Pellet"), but a recent demonstration of the "Iris" indicated that they are able to tackle a job of this kind with as successful results as with their other types. The "Iris" is intended for long-distance reconnaissance, coastal defence, and submarine patrol. It can fly without loss of altitude, with any one of its three "Condors" stopped.

(Fl.R.) Fairey "Ferret"
Bristol "Jupiter"

This machine is one of the latest productions of the Fairey Aviation Co., and like the majority of the varied aircraft turned out by this firm is intended for use with the fleet, being a three-seater reconnaissance tractor biplane. Little information regarding this machine may be published, but it may be seen from the accompanying illustration that it is a business-like looking craft, combining the general appearance of the III D and "Flycatcher" types.



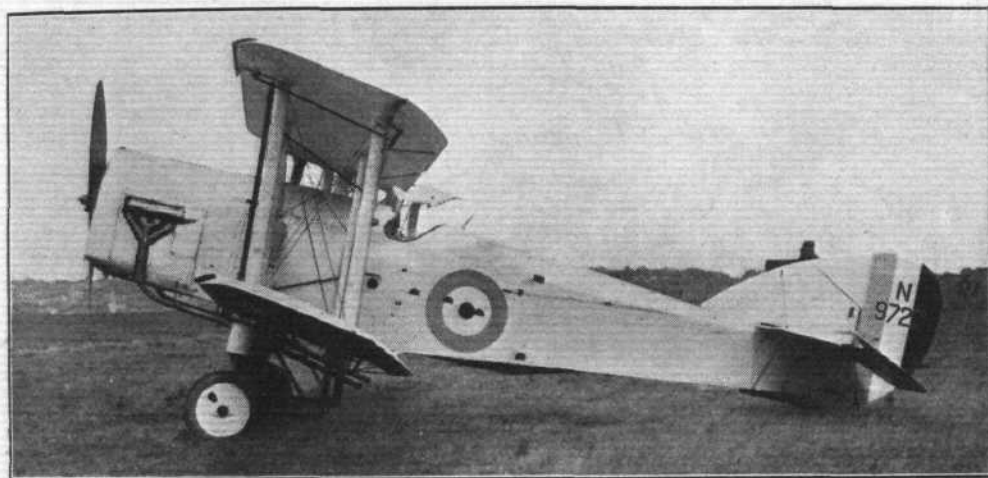
(Fl.R.) **Hawker "Hedgehog"**
Bristol "Jupiter"

The "Hedgehog" is a three-seater Fleet reconnaissance machine. The wings are of short span and fairly thick section, and a gravity tank is neatly faired off in the top centre plane. The wings fold. The pilot is seated underneath the top wing, and the gunner is just clear of the trailing edge with the second cockpit between the two. The "Hedgehog" is not yet a standard type for use in Service squadrons.



(Fl.To.) **Handley Page "Hendon"**
Napier "Lion"

This is a torpedo plane fitted with slotted wings and trailing edge flaps of an improved type. The auxiliary aerofoils are made from Duralumin and lie snugly against the leading edge when the slot is closed. It can be regarded as a parallel type to the Blackburn "Dart" torpedo plane, which it is rather like in appearance, except for the nose. The chassis is divided into two sections for the torpedo passage. The "Hendon" belongs to the smaller class of torpedo carrier, the largest class including the Avro "Aldershot" and Blackburn "Cubaroo."



BRITISH AERO ENGINES

GENERALLY speaking, it is true to say that at the present moment but four main types of aero engines are in regular use by the British Air Forces, although each of these types is produced in several sub-types or series, these sub-divisions being officially known as the Series II, Series III, etc. Curiously enough, the four main types are equally divided into water-cooled and air-cooled, two of each. Of the water-cooled types, one is a twelve-cylinder Vee engine, while the other is a twelve-cylinder W or "broad arrow" type. Both the standard service air-cooled types of engine are radials, although one make has nine cylinders arranged in a single row, while the other has fourteen cylinders arranged in two rows of seven each.

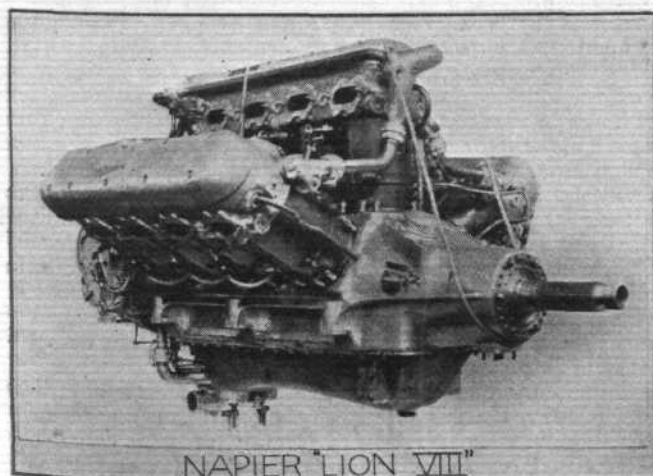
The 650 h.p. Rolls-Royce "Condor"

With a horsepower of 650 b.h.p., the Rolls-Royce "Condor" is the most powerful engine fitted as standard in British service

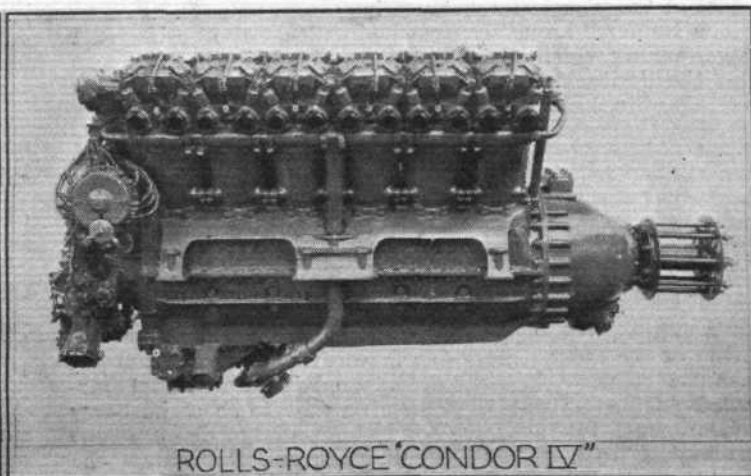
aircraft. It is, as already indicated, of the twelve-cylinder Vee type, water-cooled. In a general way the engine is similar to the famous Rolls-Royce "Eagle," which was responsible for so many famous long-distance flights in 1919, including the flight across the Atlantic in a Vickers' "Vimy" piloted by the late Sir John Alcock and navigated by Sir Arthur Whitten Brown. The "Condor" is, however, a much larger and more powerful engine, and, in addition, differs from the famous "Eagle" in many respects.

Although designed primarily for heavy machines, such as bombers, the "Condor" has been successfully fitted in small single-seater fighters, of which the Hawker "Hornbill" is one example. The engine, it might be mentioned, is produced in two forms: geared and direct-drive.

It is of interest, in connection with the announcement of a proposed attempt to beat the existing world's distance non-stop record, to note that the engine used in the Hawker

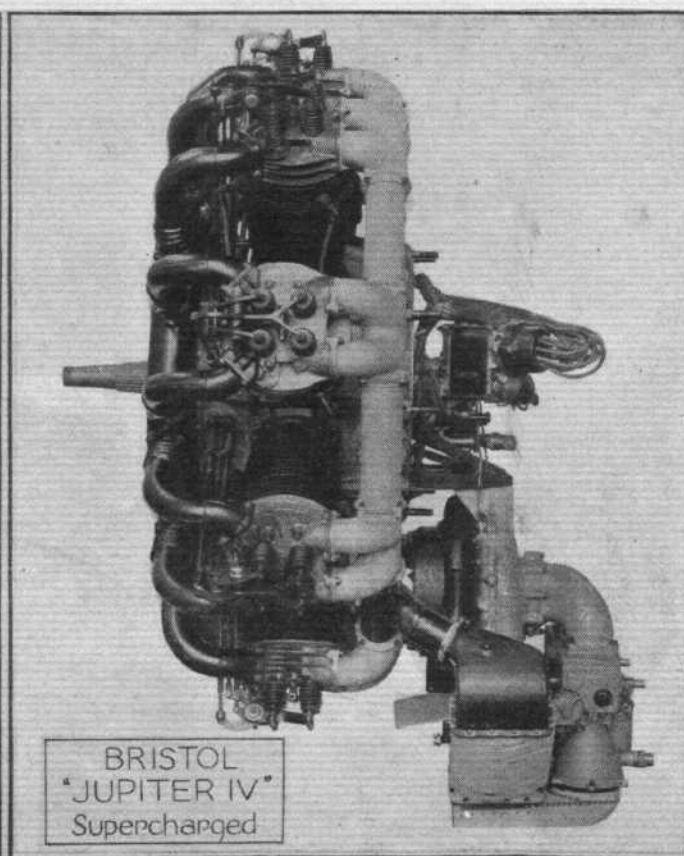
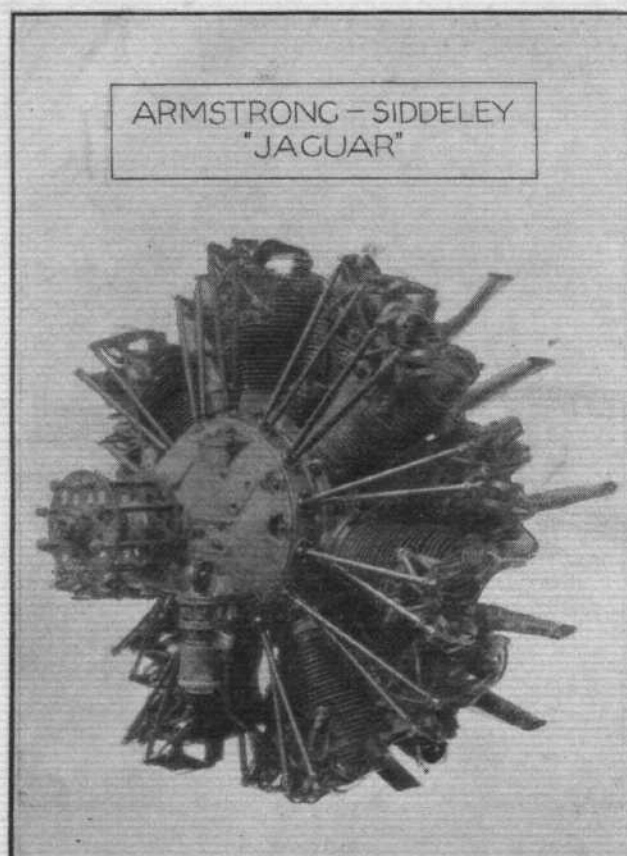


NAPIER "LION VIII"



ROLLS-ROYCE "CONDOR IV"

BRITISH ENGINES IN SERVICE: Two examples of water-cooled aero engines at present in use. On the left is the Napier "Lion" Series VIII, direct drive model, and on the right the Rolls-Royce "Condor" Series IV.



BRITISH ENGINES IN SERVICE: The radial air-cooled engines in use are primarily represented by the two shown above. On the left, the Armstrong-Siddeley "Jaguar," and on the right the Bristol "Jupiter" (Series IV, Supercharged)

"Horsley" (the machine with which the attempt is to be made) is the Rolls-Royce "Condor." As Rolls-Royce aero engines have ever had a reputation for reliability and low fuel consumption, it is permissible to be optimistic as regards the success of the attempt.

The 450 Napier "Lion"

Probably no other aero engine has ever enjoyed such world-wide popularity as the Napier "Lion." First produced towards the end of the war, 1914-18, this engine arrived too late to take an active part in the war, but during the years following the war, the "Lion" very quickly established a reputation, and during the last few years a greater number by far of "Lions" have been produced than of any other British aero engine. In fact, except for the "Liberty," it is doubtful whether any aero engine has been produced in such large numbers as has the "Lion."

The Napier "Lion" was the first aero engine of the "W," or "broad arrow" type to be produced. The arrangement of the twelve cylinders in three banks of four each makes for a very short and compact power unit. Not only so, but the specific or unit weight of this type of engine is very low, a fact of the utmost importance in service aircraft.

The Napier "Lion" has reached at least the Series VIII stage, among which variations it may be of interest to state that the Series V and VI include supercharged engines, as does also the "Lioness" type, in which the crankcase is on top, the three cylinder banks hanging down below it. The object of the "inverted" engine, as it is called, is mainly to provide a better view for the pilot. The standard type of Napier "Lion" is a geared engine, but direct-drive types of 600 h.p. are also produced, both for service purposes and for racing. Thus, two of the three machines built for the Schneider Trophy seaplane race are fitted with direct-drive Napier engines.

The 400 h.p. Armstrong-Siddeley "Jaguar"

One of the most remarkable features of recent years has been the remarkable progress made with the radial air-cooled engine, a type that may be said to be a post-war development. In the early days of the radial engine the type was looked upon rather with distrust, and for a time the development work was slow and difficult. By now, however, it can definitely be said that the radial engine has proved its worth, and is in every way the equal of the water-cooled type in power and reliability.

The Armstrong-Siddeley "Jaguar" is a radial in which the

14 cylinders are arranged in two rows of seven each, the cylinders of the back row being placed opposite the gaps between the cylinders of the front row. This makes for a very compact arrangement and relatively small overall diameter. The engine is used in a number of service types of machines, as will be gathered from a perusal of the pages dealing with aircraft.

The "Jaguar" has reached at least the Series IV stage, which is produced both as a normal naturally-aspirated type and as a supercharged engine. Our photograph shows the normal type.

Finally, it will be recollected that it was the "Jaguar" which was used by Sir Alan Cobham in his famous flights to Cape Town and back and to Australia and back, so that apart from its work in the R.A.F., the engine has proved itself in flying of a different character.

The 450 h.p. Bristol "Jupiter"

As already indicated, the Bristol "Jupiter," which has reached the Series VI stage, is a nine-cylinder radial air-cooled engine, with its cylinders arranged in a single row. As there are but nine cylinders, each of these develops 50 h.p. or so, and it is a remarkable testimony to the skill of Mr. Fedden, its designer, and to the workmanship of the Bristol company that, in spite of these powerful impulses, the engine runs smoothly and stands up to its work remarkably well. The small number of cylinders has the natural advantage that there are relatively few moving parts, and the engine is, therefore, exceptionally easy to overhaul.

The "Jupiter" is fitted in a large number of service types of aircraft, and, in addition, it was the type of engine fitted in the three-engined de Havilland "Hercules" on which Sir Samuel and Lady Maud Hoare made their successful flight from London to India.

The "Jupiter" is produced both as a normal engine and as a supercharged. The photograph of it shown on this page illustrates the supercharged type.

As supercharging has been mentioned repeatedly in these notes, it may be as well to explain to the non-technical that supercharging consists in forcing into the cylinders a greater quantity of explosive mixture than the engine would naturally draw in. Usually this charge is forced in by means of a blower placed in the induction system, and driven by a fan rotated by the escaping exhaust gases. The object of supercharging an engine is to enable it to maintain its power at great altitudes.



(Concluded from page 128)

of an aerodrome and of accommodation and repair facilities for aircraft, and £83,000 is taken towards that purpose in 1927.

At Malta, owing to the increased strength of the Fleet Air Arm, consequent on the impending completion of a new carrier, it has been found necessary to provide for the enlargement of the aerodrome and for additional facilities for Fleet Air Arm units to obtain flying practice when disembarked from the carrier. The total cost of the extension will be in the neighbourhood of £190,000, but not more than £30,000 is likely to be spent in 1927.

As in previous years, a lump sum deduction has been made from the gross total of the Vote in order to discount unforeseen delays. It has been fixed this year at £200,000.

Civil Aviation

Although the total provision for expenditure in connection with civil aviation shown under Vote 8 remains practically the same as last year, its character is materially changed. Whilst on the one hand the provision for aerodromes and buildings shows a marked decrease, the amount to be voted for subsidies for civil air transport is larger by some 40 per cent.

One hundred and thirty-seven thousand pounds has once again been provided for the subsidy payment to Imperial Airways, Limited, under the terms of the agreements with this company dated May 15, 1924, and December 18, 1925, in respect of their European airservices. Moreover, the operation of the first section (Cairo-Basrah) of the Egypt-India air service by Imperial Airways, Limited, under the agreement dated October 28, 1926, commenced in January, 1927, and it is contemplated that the service will be extended to Section II (Basrah-Karachi) in April. A sum of £93,600 has been taken in the estimates for payment of the maximum annual subsidy which can be earned by the company on this service.

The agreements providing for financial assistance to approved light aeroplane clubs will terminate as regards five of the six clubs in July next, but an investigation has revealed that, notwithstanding the success attained by these clubs in promoting aviation, they will require further assistance to enable them to continue in existence after the expiration of the present agreements. Consideration is still being given to the form which such assistance should take.

The work of enlarging and improving the Air Port of London at Croydon is proceeding satisfactorily. A sum of £111,000 for the construction of aerodrome buildings and the completion of the diversion of a public road has been included under this head. The reconstruction of the Air Port should be completed during 1928. The provision includes the erection of a new wireless telegraphy station near Croydon for the purposes of the wireless telegraphy work of the air port, and a further £10,800 has been provided for the necessary wireless equipment.

The general position in regard to civil aviation and airships is set forth in detail in a non-Parliamentary publication entitled "An Approach towards a System of Imperial Air Communications," issued in December last, which reproduces a paper I presented to the Imperial Conference. An important report by the Indian Air Board, since published by the Government of India, was also before the Conference. This indicates an intention on the part of India to take a more active part than hitherto in the development of civil aviation in the Empire, a purpose for which she occupies geographically an

important and indeed pivotal position. I have been glad by personal discussion during my recent flight to India to do what I can to assist and confirm this intention.

Meteorology.

As in previous years, the provision for meteorology is divided between the Headquarters and the Miscellaneous Vote, and is practically unchanged in the former; but the latter shows an increase of £8,000 on last year's estimate, mainly due to the expansion of the work done by the Meteorological Office for the Royal Air Force and to developments in connection with airships.

The need for meteorological stations at aerodromes of the Royal Air Force from which certain types of flights are made—especially night-bombing practice—is very real, and further stations will be required in connection with the extension of the Home Defence Force. There are at present nine meteorological stations on Royal Air Force aerodromes in the British Isles, and provision is taken in these Estimates for one more such station at Bircham Newton, the establishment of yet another being postponed until next year.

It is not practicable to give Royal Air Force officers the highly specialized training and long experience in meteorology now required for an aviation forecasting service, and the remaining officers and airmen of the Royal Air Force hitherto specially employed on meteorological work overseas are being replaced by civilian members of the Meteorological Office. This accounts for £3,000 of the increase referred to, the service personnel above-mentioned having been borne on other votes.

Airships, more than any other form of aircraft, are dependent on meteorological factors, and a considerable amount of research has to be undertaken to investigate the meteorological conditions along any route before flights can safely be made over it; and while the ship is in the air her course and speed are determined by the meteorological conditions existing at the time of which the navigating personnel require information from a network of meteorological stations. It has therefore been found necessary to form an airships division of the Meteorological Office to undertake this work. The staff employed in this division and the supplies of instruments, &c., required at the meteorological stations along the air route will tend to increase in conformity with the development of the airship programme.

Air Ministry.

Vote 10 (Air Ministry) shows a net decrease of £74,000 on last year's total, notwithstanding provision for annual increments of pay under approved scales which is only partly offset by a reduction of some £6,000 in cost-of-living bonus.

This result has been attained by the closest scrutiny of the provision under each subhead of the vote, supplemented by a variation in the method of showing allowances (to conform with the practice of Army Estimates) and by increased appropriations-in-aid, mainly in respect of the repayment by the Middle East Department of the cost of the audit staff in Iraq and Palestine.

Information on Interleaved Sheets.

In accordance with a desire expressed by the Public Accounts Committee in their Second Report, 1926, the Air Estimates are presented this year with interleaved sheets, such as are already printed with the Navy and Army Estimates. I hope that the information given in these sheets will be found of assistance in discussion of the Estimates.

AIR SERVICES APPROPRIATION ACCOUNT, 1925-26

THE *Air Services Appropriation Account* for the year ended March 31, 1926, with the *Report of the Comptroller and Auditor-General* thereon and upon the store accounts of the air services, is published as a *Blue Book* (No. 25, 2s. net). In reports for earlier years, emphasis was laid on the need for closer estimating, and comment is made on the improvement this year in this respect.

The following statement compares the results of the last three years:—

	1923-24.	1924-25.	1925-26.
	£	£	£
Gross estimate ..	18,605,000	19,742,000	21,319,310
Saving ..	1,969,294	620,142	154,435
Percentage of estimate ..	10.58	3.14	0.72
Estimated receipts ..	6,594,000	4,881,000	5,806,300
Excess over estimate ..	*463,598	*201,034	*91,428
Percentage of estimate ..	7.03	4.12	1.57
Net estimate ..	12,011,000	14,861,000	15,513,010
Saving ..	1,505,696	419,108	63,007
Percentage of estimate ..	12.54	2.82	0.41

The *Blue Book* sets out in the usual elaborate tabulated form an account of the sums granted by Parliament for air services for the year ended March 31, 1926, together with the report of the Comptroller and Auditor-General thereon, and upon the store accounts of the air services. It also contains a statement of the surpluses and deficits upon the grants for air services for the year ended March 31, 1926, showing all cases in which the Air Ministry has obtained the sanction of the Treasury to expenditure not provided for in the grants for that year, together with copies of representations made to the Treasury by that Ministry; also a statement showing the ledger balances on September 30, 1926, the date on which the account of receipt and expenditure for the year 1925-26 was closed.

Those who are concerned with these details should procure the publication from the Stationery Office, Kingsway, W.C.

* Deficit.

THE HANDLEY PAGE SLOT-AND-AILERON LATERAL CONTROL

Greatly Increased Safety Attained

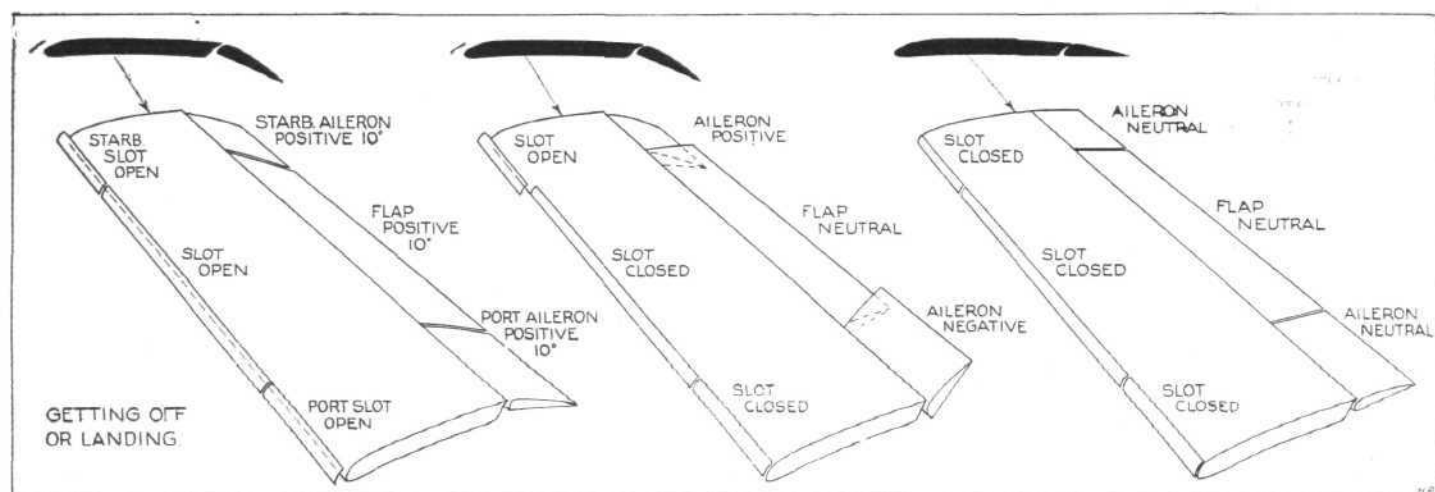
"THE case of the slotted wing is very important. It is, I think, true to say that it is the only real aerodynamical discovery of the last decade, and was undoubtedly a brilliant invention." This sentence, quoted from one of a series of articles by Mr. J. D. North (THE AIRCRAFT ENGINEER, June 24, 1926) related to the Handley Page slotted aerofoil in which the slot extends over the whole span, and not specifically to the use of wing-tips with slotted leading edge, but if Mr. North's remarks were true with reference to the complete slotted wing, they are, perhaps, even more so if applied to the combination of leading edge slots and ailerons of various types for lateral control at or beyond the stalling angle.

Let us go back to the commencement of flying, and examine briefly the history of lateral control. When, in 1903, the Wright Brothers first succeeded in making controlled flight possible, they did so by a system of inter-connection of wing warp (used by them instead of ailerons for lateral control) and rudder, and the original Wright patent covered this inter-connection, showing clearly that these great pioneers of aviation had early discovered that lateral control required

type. As a result of these tests it was reported* that "the use of the variable slot in conjunction with ailerons has been found to give a control which is greater than the sum of the controls obtained with each separately, and which at large angles of incidence is not very far short in magnitude (expressed as a coefficient) of the control given by the ailerons alone at normal flying angles. Such increased control is obtained, together with considerable decrease in the yawing moment to be overcome by the rudder."

In 1924 slot control was fitted on an Avro biplane having Frise type ailerons. The official report on the tests† states: "There is no doubt that this form of control has greatly increased the safety of flight in the region of the stall. It could with advantage be applied to fighting aeroplanes. There is no measurable loss in performance due to its use."

The Stability and Control Panel investigated the problems of lateral control of stalled aeroplanes, and issued, in 1926, a report (Reports and Memoranda No. 1,000) in which the conclusion was arrived at that "there is little doubt that the new control has added greatly to safety in flight in two respects—firstly, in enabling the pilot to counter the incipient



Diagrammatic representation of Handley Page Slot Control.

"opposite rudder" to counteract the increased drag. Thus they produced an aeroplane which was controllable over a certain range of flying speeds and angles, but the "stall," with its attendant spinning, was not found out until a good deal later.

For years it has been known that a very large percentage—how large it is difficult to estimate accurately—of accidents have been due to stalling (i.e., losing flying speed and, therefore, lift) near the ground, the stall being accompanied in most aeroplanes by a spin. It is also a familiar fact that an aeroplane requires a very considerable height in which to recover from a spin, the actual distance varying according to the characteristics of the machine. The type of lateral control which has become almost universal, i.e., the hinged trailing edge flaps, becomes weak, or even totally ineffective, at angles near or above the stall. Moreover, the fact of pulling down the aileron on one side has the effect of increasing the drag on that side, thus tending to swing the aeroplane around in such a way as further to increase the bank. The exact opposite effect is desired.

Shortly after the war Mr. F. Handley Page in this country and Herr Gustav Lachmann in Germany hit upon the idea of the slotted aerofoil, the two inventors working independently, and one without knowing anything about the work of the other. The original object of the invention was to give increased lift for a given area. It was not, however, long before it was realised that the slotted wing had possibilities as applied to lateral control, and the Handley Page firm carried out a considerable amount of research and experiment in this direction. Ultimately the Aeronautical Research Committee interested itself in the problem of slot controls, and work was carried out on wind tunnel models. This was sometime in 1922. In this instance the leading edge slot was used in conjunction with ailerons of normal

spin, and, secondly, in helping him to get out of a developed spin."

Recently yet another report on tests has been published‡ in which the conclusion is expressed that "the feeling of safety when coming slowly in to land is very marked. The increase in control at slow speeds, especially on steep turns, has probably considerably improved the aeroplane's fighting efficiency. In two mock fights carried out at the R.A.E., in which the pilots were interchanged between the flights, the Bristol Fighter with the slot control outmanoeuvred the standard aeroplane on each occasion."

By way of testing the slot control on a machine of a very different type, a de Havilland "Moth," with 60-h.p. "Cirrus" engine, was fitted with this control and tested at Martlesham Heath. The report of this establishment states that "The aircraft is very easy to fly, and in respect of handling qualities is very suitable for instructional purposes, particularly when fitted with the ailerons with slots, which almost eliminate the risk of serious accident through inadvertent stalling."

We have now reached 1927, and the evidence which has been accumulated all goes to show that the slot control in conjunction with ailerons provides powerful control in the stalled state of the aircraft. That being so, surely the obvious line of development is to fit the slot control on really fast machines for the purpose of ascertaining whether any unforeseen difficulties arise. If not, the logical result would seem to be the fitting of slotted lateral control to all types of aircraft.

It might be argued that control in the stalled state does not constitute a cure of the stall itself. While that is true it is equally true that the stall loses most of its dangers if controllability is retained. We do not wish here to go into

* Reports and Memoranda, No. 856. † Reports and Memoranda, No. 1,068. ‡ Reports and Memoranda, No. 1,051.

the technical arguments concerning stalls, spins and control, but would confine ourselves to outlining very briefly the circumstances that generally obtain.

When a machine is stalled, the controls, as we have already mentioned, usually become weak or ineffective. The stall turns into a spin, and the machine loses several hundred feet in height before it can be brought out of the spin. If the necessary height is not available, the result is a crash. If, on the other hand, the controls are sufficiently powerful (as tests and experiments have repeatedly proved the

Handley Page slot controls to be), the spin is avoided, and instead of having to drop several hundred feet the machine can be "unstalled" probably in as many tens of feet.

We are aware that it is possible to design machines which will not stall violently, but the slot control does seem to have the advantage of being applicable to any existing type of British machine, which in itself is a very strong reason for its general adoption, the more so as, according to one of the reports quoted, "there is no measureable loss in performance due to its use."

CURIOSITIES FROM THE FOUR WINDS

Civil Aviation in India

WHEN the Government Vote for the supplementary grant of £74,700 came up in the Legislative Assembly in India on March 1 for the purchase of aerodromes in Bombay, Calcutta and Rangoon, some opposition was raised, as these proposals for the development of internal aviation were regarded as another attempt to accord preferential treatment to Great Britain to assist her to exploit the people of India. But this opposition was punctuated with humour, and its main argument was that India must have a progressive policy for internal aviation, and that an essential condition of this must be the training and employment of Indians. The Government now, subject to the Assembly's approval, stands pledged to appoint a Director of Civil Aviation and to encourage internal air services by subsidy, the companies having a majority of Indian directors, or if the subsidies prove too heavy a burden on the Treasury then the State is to start air services.

Oslo-Harwich Experimental Air Service

THE Dornier-Wal flying-boat N. 25, which Captain Amundsen used on his attempt to reach the North Pole in 1925, left Horten, Oslofjord, for Harwich, at 7.10 a.m. on March 2, on the first of the eight flights organised by the Norwegian Aeronautical Association, with a view to inaugurating a regular air mail and passenger service between Oslo and Harwich. It returned to Horten from Harwich on March 7.

Major Franco's Spain—New York Attempt

MAJOR FRANCO, who flew the South Atlantic last year, intends to make a non-stop flight from Spain to New York on a seaplane considerably larger and more powerful than his first machine, which he is taking over in Germany shortly. Should he succeed in his project he will attempt a world's flight in the same machine. The flight will probably take place in July if his machine is ready, and he will be accompanied by Ruiz de Alda and the mechanic Rada who were with him on his last big flight.

Uruguayan Airmen Safe

THE four Uruguayan airmen who are flying from Italy to Buenos Aires, and who have recently been missing off the coast of Morocco, have been reported safe at Cape Juby. Their wrecked flying-boat was found by French pilots on the Latécère Air Line, which flies between Casablanca and Dakar.

Fonck's Second Bid for Atlantic Flight

THE famous French ace, Captain Fonck, whose attempt to fly the Atlantic ended so disastrously last September, intends to make another attempt in the early summer, apparently on a similar type of machine, a Sikorsky.

Portuguese World Flight

THE four Portuguese airmen who are attempting a world flight, as reported in our last issue, arrived at Bolama, in Portuguese West Africa, on March 6, having left Lisbon on March 3. Their next intended stage is across the South Atlantic to Port Natal, Brazil, a distance of 1,850 miles.

"City of Cairo" Air Liner

At the Heliopolis Aerodrome on March 3 there was a large and distinguished gathering when King Fuad named the De Havilland "Hercules" machine the "City of Cairo." Those present included Lord Lloyd, the High Commissioner, and Lady Lloyd, the Residency staff and guests, Palace officials, Cabinet Ministers, high Government officials, and senior Army and Royal Air Force officers and their wives. The ceremony was begun with a speech by Lord Lloyd, in

which he congratulated King Fuad on having opened an air service linking five countries, and he paid a tribute to his keen interest in modern progress for the benefit of Egypt. Then the King pulled a cord which uncovered the nameplate of the machine and released a flight of pigeons from the cockpit, following which a representative of Imperial Airways, Ltd., presented the King with a silver model of the machine. Demonstration flights followed, during which Lord Lloyd and Lady Lloyd, their guests, Ministers, journalists and officials were taken up. Over 100 people flew.

British Machine to attempt World's Record

Now that the daily press has given the secret away by telling all it knows, there can, presumably, be no harm in mentioning a scheme which is in preparation for attempting to beat the existing non-stop long-distance record held by two French aviators, who flew from Paris to Jask, a distance of 3,345 miles. The machine to be used is a Hawker "Horsley" with Rolls Royce "Condor" engine, specially fitted up for such a flight. In place of the usual paraphernalia carried by the machine as a bomber, extra large tanks have been installed, the total capacity of which exceeds 1,000 galls. (more than 7,000 lbs. weight of petrol). During experiments carried out at Brooklands an extraordinarily low petrol consumption has been obtained from the "Condor" engine, and all indications are that the machine should be able to beat the existing record by a handsome margin, although weather conditions will, naturally, have a great effect on the distance covered. The intention is that the machine shall be manned by a crew drawn from the R.A.F., and not by civilians.

Pinedo's Progress

As reported last week, the Marchese de Pinedo arrived at Porto Alegre on March 1. He left the next day and arrived at Buenos Aires at 12.40 p.m. There he received a very boisterous welcome, bombs being exploded by the newspapers, and vessels in the harbour sounded their sirens. Thousands of people crowded the roofs to watch the approach of the flying boat and ten seaplanes of the Argentine Navy escorted it to the harbour. The airmen received a great ovation as they drove to Government House, where they were welcomed by the President.

Mr. Chadwick Ill

WE are sure his many friends will be sorry to learn that Mr. Roy Chadwick, the Avro designer, is in a London nursing home, following an operation. It may be recollected that some years ago Mr. Chadwick had a nasty crash, and the trouble is connected with this. He is at present reported to be progressing favourably, and we hope his recovery will be a speedy one.

Fast London-Berlin Trip

CAPTAIN R. H. McINTOSH, the Imperial Airways pilot, set up a new record between London and Berlin on March 3, when he flew the distance of 620 miles in 4½ hours. He is one of the veteran pilots on the air lines to the Continent, having just completed eight years' continuous flying.

Remarkable Flying Accident in Finland

A REMARKABLE flying accident occurred at Helsingfors on February 23. A Finnish army aeroplane was engaged in bombing practice, and when at an altitude of 3,500 ft. some of the bombs in the machine exploded, blowing the machine to pieces and killing the occupants instantly. It is not known what caused the bombs to explode.

SAVOY BANQUET IN HONOUR OF SIR SAMUEL HOARE

A BRILLIANT and distinguished gathering, representative of political, aeronautical and social life, attended the banquet given by the Royal Aero Club in honour of Sir Samuel Hoare, at the Savoy Hotel on March 2. The Chairman, Lord Thomson, announced messages of regret from many famous people unable to attend, including one from the Prime Minister. He expressed gratitude that the distinguished air travellers had returned safely, despite their relapse to terrestrial travel during the last lap of their journey. He ventured to say that in 10 years' time no man of the Air Minister's distinction in life would consider travelling except by air. No flight had aroused public interest so much. It had been enhanced in its value as an example of air travel by the presence of Lady Maud Hoare. Her venture, in face of all difficulties, and its successful accomplishment would appeal to millions, and bring admiration for a courageous woman, with a corresponding effect on their understanding of air travel as an ordinary feat and not a stunt, as they considered it when a famous pilot made a memorable flight. Many Secretaries of State would have been unwilling to take their wife on a trial flight, but as a result of this exception we had a distinguished British couple flying to India and back who would be the forerunners of many other happy couples on similar long-distance flights in the future. In connection with Air Ministry work, said Lord Thomson, the position of the Secretary for Air was most fascinating. He was always in an atmosphere of new ideas, always receiving advice, often contradictory, numbers of opinions—some sober, some fantastic, but all interesting; and always meeting a wide variety of types in the military and civil aeronautical worlds, who came with a common apostolic fervour—to quote Mr. Handley Page—but which all meant an excursion into aviation money. Now, behind the Air Minister was the grim, elephantine Chancellor of Exchequer, so that he was always between the devil and the air existence. All the time he was reminded of the dual nature of his responsibilities. He was not merely a political head of the R.A.F., he was the foster parent of a new industry. He therefore played a gigantic part in the future of the race. Aviation brought a menace and an opportunity to him. The menace was the necessity for creating a defence for the hour of need and the opportunity lay in the development of civil aviation. If we developed an air transport of service to the whole world, then the opportunity would overshadow the menace. No Air Minister had shown a keener perception of his duties than Sir Samuel Hoare. He had proved it by deeds. At the close of the harrassing Parliamentary session he had disdained rest and set out, accompanied by his wife, to forge a big link for Empire air communication. That was more than a gesture; it was a feat. 1926 had been a memorable year for aviation, for acts thought impossible 10 years ago had been accomplished. It marked a climax in progress, due to Sir Samuel Hoare, and it ushered in this year with fine promise. For this reason all had gathered to welcome Sir Samuel and Lady Maud Hoare and wish them long life and health in the name of the public for services to aviation.

Sir Samuel Hoare rose and said that when he looked round and saw the types of people he met in the course of his duties, he felt proud, and he could describe them in the language used recently by Mr. H. G. Wells as "a galaxy of brilliant, energetic and enterprising people who are the magnates of the air world to-day." Referring to the eulogy of him by the Chairman, he said that setting aside the personal aspect, two fine principles were apparent: one was that, whatever political differences they had there were none socially, and secondly that they had no mundane argument on air policy. He thought that when he produced the Air Estimates in the House next week, no objection would be found to them by Lord Thomson. There had been a continuity of policy in air matters by Lord Thomson and himself, and ever since the war. With reference to his recent flight, he thought that all credit was due to Lady Maud Hoare and the hosts of enthusiasts who had organised the flight and nursed it and made it successful. After all, it had required some nerve for a woman to have set off in that dark early morning on the first flight of the new route. He claimed no part in the same category as that of others. He noticed General Guidoni was present. He suggested his flight was not comparable to that of Pinedo's fine leap recently across the South Atlantic. Describing some of his experiences on the journey, he paid tribute to the great assistance of the R.A.F.

At every aerodrome there was every facility waiting them, and it was through this that the flight was made with such punctuality. It was an enthralling experience. Day after day widened the interest. It brought new scenes. They

made their two stages of 300-400 miles each day with regularity, and this made a great impression. Many were anxious to make flights when they saw them arrive. At Delhi some of the leading personalities of the city were taken for a flight, and some one—who was probably an aspirant for office—wanted to know whether it was not possible to arrange to crash them! Another suggestion that had been made with reference to their final lap home by rail and sea was, had they then been killed it would have put the coping-stone on the success of the air tour! Sir Samuel said that the future success of aviation depended on the closest co-operation between military and civil aviation. He thought that such a trip as he had undertaken would react on future civil flying. The journey was needed as an example of what could be done, and to prove that it was possible to fly in all weathers punctually and regularly. He did not assert that his tour in particular was responsible, but since then the Government of India had decided on a policy of civil aviation. That was, at least, a happy sequence. He thought there were fine opportunities for flying in India. He hoped his flight would expedite the time when Empire air routes would be properly organised. The beginning made under such auspices would lead to the success of the future. He had got the impression that our countrymen overseas were thinking that British nerve was deteriorating, and he thought that their flight had had the good effect of altering their view.

Lord Haldane, in proposing the toast to the Chairman, Lord Thomson, said that he knew from their association in the peaceful precincts of the House of Lords that Lord Thomson was ever alert on air matters. Sir Samuel Hoare had a true sense of the continuity of policy, and in that he was supported by his predecessor. Lord Thomson was more than a politician or statesman, he was something approaching a poet, and to prove this he recommended a book written by him. Although he was now no longer in office, he was none the less as keen on aviation policy as when he was.

In supporting the toast to the Chairman, Mr. Amery mentioned his consternation on finding that he was expected to speak, but he did not think it equalled that of Lord Thomson's when he saw him, Mr. Amery, there; for he knew the chairman so well. However, although it was not possible to trust to the tongue altogether, he would try to be discreet. We owed a debt to Lord Thomson for the way he carried on when in office for the period that must have been all too brief for him. He could say that he looked forward with interest to the time when Lord Thomson resumed office again. He would then find in the twenty years that had intervened (laughter) immense strides would have been made. In that time Sir Samuel Hoare's flight would seem a very small accomplishment, and he doubted whether the different aeronautical bodies would trouble to gather like this to welcome Lord Thomson after his world air tour!

In returning his thanks, Lord Thomson paid tribute to the work done by those in the Ministry under him when he was in office, and mentioned the tyranny they imposed on him. He found the way was paved smoothly if the Minister was always obedient and docile. (Laughter.)

Among those present were Sir Philip A. G. D. Sassoon, G.B.E., C.M.G., M.P.; Lord Gorell, C.B.E.; Air Marshal Sir Hugh Trenchard, G.C.B., D.S.O.; Lieut.-Col. Sir Francis and Lady McClean, the Right Hon. W. C. Bridgeman (First Lord of Admiralty); the Right Hon. L. C. M. S. Amery; Sir Henry White-Smith, C.B.E.; Mr. and the Hon. Mrs. Sopwith; Col. the Master of Sempill and the Hon. Mrs. Forbes Sempill; Air Vice-Marshal Sir John Higgins, K.B.E., C. L. Bullock, Esq., C.B.E., Air Vice-Marshal Sir Vyell Vyvyan and Lady Vyell Vyvyan; Sir Herbert Hambling, J.P.; Mr. Philip S. Foster; Mr. and Mrs. H. T. Vane; Sir John and Lady Shelley-Rolls; General Guidoni, Italian Air Attaché; Mr. A. H. R. Fedden; Major and Mrs. H. Hemming; Captain F. L. Barnard; Lieut.-Col. W. A. Bristow; Lieut.-Col. M. O. Darby; Major Gilbert Dennison; Group-Captain Fellowes, D.S.O.; Sir Samuel and Lady Instone; Air-Commodore A. M. Longmore and Mrs. Longmore; Mr. F. Handley Page and Mrs. Page; Mr. C. R. Fairey; Mr. and Mrs. R. Blackburn; Major and Mrs. R. H. Mayo; Mr. A. V. Roe; Mr. H. O. Short; Major Sippe, D.S.O.; Major C. G. Turner; Mr. and Mrs. C. C. Walker; Major B. F. S. Baden Powell; Mr. J. L. Pritchard; Major T. Searight; Lieut.-Col. Vincent Nicholl, D.S.O., and Mrs. Nicholl; Wing-Commander T. O'B. Hubbard, M.C., A.F.C.; Lieut.-Col. J. Barrett-Lennard, C.B.E.; Captain R. B. Davis, R.N., V.C., D.S.O.; Professor Drummond; Major and Mrs. H. G. ffiske; and Commander James Bird.

THE ROYAL AIR FORCE

London Gazette, March 1, 1927

General Duties Branch

The follg. Flight Cadets having successfully passed through the R.A.F. Cadet College, Cranwell, are granted permanent commissions as Pilot Officers with effect from Feb. 15, and with seny. of Dec. 11, 1926:—F. D. Biggs, R. Brown.

The follg. Pilot Officers are promoted to rank of Flying Officer:—H. A. Evans-Evans (Sept. 7, 1926) (substituted for *Gazette*, Jan. 18, 1927); L. W. Cannon, T. N. McEvoy, W. M. C. Kennedy (Jan. 30). Flight Lt. R. S. Martin is transferred to Reserve, Class C. (Jan. 3) (substituted for *Gazette*, Jan. 7); Pilot Officer E. L. Cowan relinquishes his short service comm. on account of ill-health (March 2); I. M. N. Mudie, Lt., R.N., Flying Officer R.A.F., relinquishes his temp. commission on return to Naval duty (Feb. 13).

Stores Branch

Flying Officer C. Hanson-Abbott is granted a permanent commn. in this rank with effect from June 24, 1926, on completion of probationary service; Pilot Officer E. H. Broad is promoted to rank of Flying Officer (Feb. 10).

Medical Branch

Flying Officer D. Oliver, B.A., resigns his short service commn. (March 2).

Reserve of Air Force Officers

Flying Officer J. R. Foster is confirmed in rank (Feb. 24). The follg. Flying Officers are transferred from Class A to Class C:—C. K. Robinson (Dec. 11, 1926); J. M. S. Taylor (Feb. 26). The follg. are transferred from Class B to Class C:—Flight Lt. D. K. Cameron (Feb. 26); Flying Officer W. Parkinson (Dec. 30, 1926). The follg. Flying Officers relinquish their commns. on completion of service:—M. W. Baseden (Sept. 12, 1926); A. E. Hempel (Feb. 24).

AUXILIARY AIR FORCE

General Duties Branch

The follg. to be Pilot Officer:—No. 600 City of London (Bombing) Squadron—P. G. Stewart (March 1).

PRINCESS MARY'S R.A.F. NURSING SERVICE

Sister Miss M. C. Messer is placed on retired list on account of ill-health (Feb. 17).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: C. H. K. Edmonds, D.S.O., O.B.E., to R.A.F. Depot, Uxbridge, pending posting, 7.3.27. E. H. Johnston, O.B.E., D.F.C., to Armament and Gunnery Sch., Eastchurch, to command; 7.3.27. Hon. L. J. E. Twisleton-Wykeham-Fiennes, to No. 503 Sqn., Waddington, to command; 25.2.27.

Squadron Leaders: A. Durston, A.F.C., to Schl. of Naval Co-operation Lee-on-Solent instead of to R.A.F. Depot, as previously notified. F. J. Vincent, D.F.C., to No. 84 Sqn., Iraq, 11.2.27.

Flight Lieutenants: J. H. O. Jones, to R.A.F. Base, Calshot; 2.3.27. F. Workman, M.C., to Home Aircraft Depot, Henlow; 1.3.27. R. S. Sorley, D.S.C., D.F.C., to Air Ministry (Directorate of Tech. Development); 1.3.27. J. A. Elliott to No. 22 Group H.Q., Farnborough; 11.3.27. R. L. Stevenson, M.B.E., to R.A.F. Depot, Uxbridge, on transfer to Home Estab; 26.2.27. C. Chapman, D.S.C., to R.A.F. Depot, Egypt; 9.2.27. D. M. Fleming, to Aircraft Depot, Iraq; 7.2.27. C. W. Attwood, to School of Army Co-operation, Old Sarum; 14.3.27.

Flying Officers: J. E. Davies, to No. 5 Armoured Car Coy, Iraq; 1.2.27. F. S. Homersham, D.C.M., M.M., to No. 47 Sqn., Egypt; 1.2.27. J. S. Nichol, to No. 2 Sqn., Manston; 7.3.27. T. J. E. Thornton, to No. 39 Sqn., Spittlegate; 1.3.27. R. N. Hesketh, to R.A.F. Depot, Uxbridge; 25.2.27. S. Wallingford, to R.A.F. Base, Calshot; 2.3.27. E. H. Collinson, M.C., to

R.A.F. Base, Calshot; 3.3.27. R. F. Casey, D.F.C., to remain at Central Flying Schl., Wittering, instead of to No. 39 Sqn., as previously notified. J. J. Teasdale, to H.M.S. "Furious"; 26.2.27. A. C. Meredith, to R.A.F. Depot, Uxbridge; 2.3.27. (Hon. Flt. Lieut.) R. Stiven, to H.Q., Inland Area, Stanmore, on transfer to Home Establishment; 3.3.27. K. G. Garvie, to No. 6 Armoured Car Coy., Iraq; 19.2.27. C. G. G. Wledge, to Inland Water Transport, Iraq; 17.2.27. G. J. Southam, to No. 47 Sqn., Egypt; 19.2.27.

Pilot Officers: W. B. Causer, to No. 47 Sqn., Egypt; 8.2.27. F. H. Bailey, to No. 14 Sqn., Palestine; 11.2.27. J. W. Busteed, to Heliopolis Details; 15.2.27.

Stores Branch

Flight Lieutenants: F. H. Sims, to Central Supply Depot, Iraq; 15.1.27. C. T. Davis, to R.A.F. Station, Northolt; 21.2.27.

Flying Officers: D. W. Dean, to No. 23 Group H.Q., Grantham; 12.3.27. R. Q. Bamber, to R.A.F. Depot, Uxbridge, on transfer to Home Estab; 6.2.27.

Accountant Branch

Flight Lieutenants: J. M. Adams, to No. 47 Sqn., Egypt; 28.1.27.

Flying Officers: E. W. Horncastle, to R.A.F. Base, Malta; 2.1.27. J. L. Armstrong, to No. 23 Group H.Q., Grantham; 4.3.27.

Medical Branch

Flight Lieutenant: L. C. Palmer-Jones, M.B., to No. 4, Flying Training Schl., Egypt; 4.2.27.

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

THERE has been no flying during the week. The total flying time for February was 116 hours 45 minutes, as follows:—

	Flights.	Hours.	Minutes.
Dual training	113	52	10
Solo training	14	4	35
Solo flying	96	36	45
Test flying	63	10	35
Passenger flying	34	12	40
Total	320	116	45

The Lancashire Aero Club

REPORT for week ending Saturday, March 5:—Total flying time for the week, 7 hrs. 50 mins., made up as follows:

Dual, with Mr. Brown: Mr. Crosthwaite, 55 mins.; Miss Brown, 35 mins.; Mr. Ruddy, 30 mins.; Mr. Dickinson, 25 mins.; Miss Emery, 20 mins.; Mr. Forshaw, 10 mins.

Solo: Mr. Michelson, 1 hr. 15 mins.; Mr. Costa, 45 mins.; Mr. Goodfellow, 25 mins.; Mr. Lacayo, 25 mins.; Dr. Wade, 25 mins.; Mr. Hardy, 15 mins.

Joy rides: With Mr. Cantrill, Mr. Chadwick, 25 mins.; with Mr. Goodfellow, Mr. Prince, 10 mins.

Test flights, 50 mins.

It may be true that this is not a country fit for heroes to live in, but at least it has an atmosphere fit for heroes to fly in. A bit more of it and the clubs will need all their Hampshire Hopefulness, London Liveliness, Midland Masterfulness, Yorkshire Youthfulness, Newcastle Never-say-die-ness, and Lancashire Let-em-all-come-ness to keep on keeping on.

During the week Mr. Michelson completed his 20 hrs. solo flying, and will no doubt join the ranks of club "joy-ride" pilots in due course.

Further interesting news has come to light anent Mr. Cantrill's attempt to fly to Norwich. Apparently, having exhausted every means of getting across the Pennines short of following the railway line through the tunnels, he tried to get a lead from a sports car which was going across at a fair pace with its headlights on owing to the general gloom and murk. Unfortunately the attempt was foiled by the fact that the driver, after leading in this fashion for a few miles, stopped and waited in an expectant attitude. It is thought that he had been reading the papers and was expecting Mr. Cantrill to land on the road alongside him and ask for a fill-up from his spare tin.

Mr. Bartrum, who has been our ground engineer (rigger) since the early days of the club, was smitten down with pleurisy about a fortnight ago, and was only just recovering when he lost his mother on Sunday. One offers him one's own and the club's sincerest sympathy.

The Midland Aero Club, Ltd.

REPORT for week ending February 19:—The total flying time was 7 hrs. 26 mins.

The following members were given dual instruction by Capt. McDonough:—J. Brinton, H. Beamish, C. Fellowes, H. D. Coleman.

The following "A" Pilots made solo flights:—W. Swann, G. V. Perry, E. R. King, E. J. Brighton.

Passengers with Mr. Brighton:—S. H. Smith, W. Nunn, V. M. Parsons, C. H. James.

On Thursday, Wing Commander Rippon had a flight with Capt. McDonough.

Mr. C. Fellowes made his first flight solo on Saturday, which was satisfactorily carried out. He afterwards flew for 15 mins. solo.

Fog has been very prevalent throughout the week. On Sunday, visibility was extremely bad at 1,000 ft., but at 2,000 ft. the air was exceptionally clear, with brilliant sunshine.

Report for week ending March 5:—The total flying time was 3 hrs. 10 mins. The following member was given dual instruction by Capt. McDonough:—A. Ellison.

The following Members made solo flights:—G. V. Perry, A. M. Glover, E. J. Brighton.

Very high winds during the week restricted flying.

The second Midland Aero Club Dance will be held at the Palace Ballroom, Erdington, on Friday, March 25, from 8 p.m. to 12 p.m. Tickets, price 5s. each, may be obtained from the Secretary, 22, Villa Road, Handsworth, or from the Hon. Secretary of the Dance Committee, Mr. S. H. Smith, "Windermere," Orchard Road, Erdington, Birmingham.

Newcastle-upon-Tyne Aero Club

FLYING report for week ending March 6:—The Club has only one Moth on service now, but it is hoped that the Avro will be going again in a week or so.

Mr. Irving is making excellent progress towards recovery from the results of his accident. The broken arm is likely to be rather a time in becoming strong enough to enable him to fly, but he is very anxious to get into the air again.

Total time for week (no flying until Saturday, owing to fog, rain, or wind) 7 hrs., made up of 2 hrs. 20 mins. dual, 4 hrs. 25 mins. solo ("A"), and 15 mins. engine test.

The following Members flew, under instruction, with Mr. Parkinson (who has returned from C.F.S. full of beans and with an excellent report and A.1. Certificate):—Mr. Rasmussen, Mrs. Heslop, Mr. Turnbull, Mr. Wilson and Mr. Miesegaes.

"A" Pilots.—Mr. C. Thompson with Mrs. Heslop and Mr. Luckman, Dr. Dixon with Mr. Brownell and Mr. Howard. Mr. R. N. Thompson. Mr. N. S. Todd with Mr. A. Bell.

The Yorkshire Aeroplane Club

REPORT for the week ending March 6:—Total time flown, 10 hrs. 20 mins. Solo, 5 hrs. 45 mins. Dual instruction, 1 hr. 25 mins. Tests, 10 mins. Cross-country flight 3 hrs.

The last item refers to Messrs. Wayman and Barnes' attempt to reach Norwich on February 25, their flying time not being available for last week's report.

On Friday, March 4, Capt. West sent over by train to Brough with the intention of flying back the same day in the "Avro," the loan of which to the Club has been kindly offered by the North Sea Aerial & General Transport, Ltd. Unfortunately, the C. of A. of this machine required to be renewed, so that he was unable to bring it back. Mr. Mann took "L.S." over on Sunday, and they both returned in her after lunch. On Sunday, Messrs. Wayman and Dawson between them gave flights of 5 mins. each to four prospective members (Messrs. Briggs, Bullock, Small and Wilkinson).

The following flew solo:—Messrs. Mann, Dawson and Wayman.

Dual:—Messrs. Wilson, Batcock, Ling and Clapham.

The "Wren" was experimentally run up in the hangar on Sunday morning, when the engine attained a maximum of 2,500 r.p.m., but no attempt was made to take it up without the owner's (Mr. Smith) permission.

R.A.F. BOXING

THE Royal Air Force Boxing Championships were begun at Halton Camp on March 2, and the finals were concluded on March 3. The results were:—

Officers' Events.—Featherweights: Final—Flight-Lieut. H. E. Walker (Waddington) knocked out Pilot-Officer C. E. M. Turton (Digby) in the first round. Light weights: Final—Flight-Lieut. G. V. Howard (Worthy Down) knocked out Flying Officer F. W. M. Matthews (Eastchurch) in the second round. Welter Weights: Final—Pilot Officer H. J. J. Mumford-Matthews (Old Sarum) walked over, Pilot Officer R. A. Wills (Calshot) scratched (by order of the Medical Officer). Heavy Weights: Final—Flying Officer P. G. Chichester (Manston) (holder) beat Flight-Lieut. B. J. Brady (West Drayton) in the second round. Middle Weights: Final—Flying Officer S. A. Thorne (Upavon) beat Flying Officer F. W. Allan (Uxbridge) on points. Light-Heavy-Weights: Final—Flying Officer J. P. Hederman (Old Sarum) beat Flying Officer R. E. Nichol (Larkhill) on points.

Airmen's Events.—Feather Weight: Final—A. C. Boteler (Manston) beat L. A. C. Blaze (Northolt) on points. Welter Weights: Final—A. C. Page (Manston) knocked out A. C. McGinn (Henlow) in the first round. Middle Weight: Final—A. C. Rollason (Larkhill) beat A. C. Sully (Kenley) in the third round. Heavy Weight: Final—A. C. Lewis (Bircham Newton) beat A. C. Forrester (Bircham Newton) on points. Fly-Weights: Final—A. C. Love (Kenley) beat L. A. C. Hill (Hendon) on points. Bantam Weights: Final—A. C. Callicott (holder) (Manston) beat Sergt. Ballantyne (Worthy Down) on points. Light Weights: Final—A. C. Garrett (Halton) beat L. A. C. Roberts (Duxford) on points. Light-Heavy-Weights: Final—A. C. Marshall (Felixstowe) beat A. C. Mather (Halton) on points.

Auxiliary Air Force.—Light Weight: Final—A.C2. Cassidy (No. 605 Squadron) beat A.C2 Bird (No. 601 Squadron) on points. Middle Weights: Final—A.C2 Kinningdale (No. 601 Squadron) beat A.C2 N. A. Berry (No. 600 Squadron) in the second round.

R.A.F. Squash Rackets

THE R.A.F. Club defeated the Cavendish Club in the second division of the Bath Club Cup squash rackets competition at the R.A.F. Club on March 1 by two matches to one.

R.A.F. Recruiting

RECRUITING for the R.A.F., which has recently been suspended, is now open again at the new Headquarters of Inspectors of Recruiting, R.A.F., Gwydyr House, Whitehall. Vacancies exist at present for skilled and semi-skilled blacksmiths, carpenters, propeller makers, draughtsmen, store-keepers and wireless operators, and also for a few competent clerks and musicians. The rate of pay ranges from 14s. to £1 4s. 6d. a week, with free rations and accommodation. The age limits are from 18 to 30.

An Excellent Aeronautical Booklet

A BOOKLET on "Flying for All," by a representative of the *Morning Post*, in which he describes his experiences while learning to fly, as a member of one of the light aeroplane clubs, has been produced by Messrs. C. C. Wakefield & Co., Ltd. It will be distributed to prospective members by the clubs' secretaries.

Rear-Admiral Murray Sueter's New Appointment

REAR-ADMIRAL MURRAY SUETER, M.P., has been appointed a member of the Air Transport Sub-Committee of the Aeronautical Research Committee.

Sir John Salmond in Rome

AIR VICE-MARSHAL SIR JOHN SALMOND visited the military aerodrome at Centocelle, near Rome, on March 3.

A Beach Aerodrome for Bournemouth?

THE proposal to set apart 80 ft. of beach at Bournemouth for flights during the summer was criticised at a meeting of the Council as being dangerous to children and bathers. It was advanced that proper caution would prevent danger, and that other resorts were considering similar proposals. It was intended to start a service, too, between Bournemouth and the Isle of Wight. The scheme is to be further considered.

The Light Airship Club

THE Air Ministry has decided that for the present it will not grant a subsidy to the Light Airship Club. This decision is causing much comment in the air world, as it is apparently in conflict with their general policy of intensively developing lighter-than-air craft. The Air Ministry is relying more on airships than aeroplanes for instituting the great Empire air routes. It is naturally contended, then, that airships flying by the club would provide a means of training the crews for these air routes, and also gain the public's confidence in lighter-than-air craft.

SIDEWIND

WHILE the Marquis de Pinedo, who has just successfully accomplished the first big section, from Italy to South America across the Atlantic, of his 25,000-mile world flight, is making a point of this flight being an "all-Italian" one, we understand that it will not be entirely so. The machine (Savoia S.55) and engine (Isotta-Fraschini Asso) are of Italian manufacture, but British plugs and instruments are being employed, having been specially chosen for the flight by Marquis Pinedo. The plugs used are "K.L.G." supplied by S. Smith & Sons (M.A.), Ltd., who, of course, also supplied practically the whole of the instrument and navigating equipment.

COMPANY DOINGS

D. Napier & Son, Ltd.

THE directors, in presenting the balance sheet as at September 30, 1926, report a profit on the year's trading, including interest on investments (after providing for depreciation, interest, taxation, directors' and trustees' fees, managers' commissions and contingencies), amounting to £201,793 17s.; add balance brought forward, £72,871 16s. 8d.; total, £274,665 13s. 8d. Deduct dividend paid on preference shares at 7½ per cent. per annum (less income tax) for the twelve months ended June 30, 1926, £22,500, and interim dividend of 5 per cent. (less income tax) paid on ordinary shares on September 17, 1926, £27,300, leaving £224,865 13s. 8d.

The directors recommend that a final dividend of 10 per cent. (less income tax) be paid on the ordinary shares, making in all 15 per cent. (less income tax) for the year, £54,600, leaving (subject to the capitalisation proposed as below mentioned) a balance of £170,265 13s. 8d.

The directors also recommend the capitalisation of a further £182,000 of the undivided profits of the company by the payment up out of such profits and distribution amongst the ordinary shareholders of fully-paid bonus shares to this amount. It is proposed to provide these profits as to £50,000 from reserve, and as to £132,000 out of the above balance of £170,265 13s. 8d. to profit and loss account, leaving £38,265 13s. 8d. to be carried forward.

It is proposed that the bonus shares shall consist of 8 per cent. non-cumulative preference shares, ranking both as to dividend and capital behind the existing preference shares, but in priority to the ordinary shares.

Handley Page, Ltd.

IN the proposed reorganisation scheme of Handley Page, Ltd., to be submitted to the shareholders on March 16, the directors propose to reduce the capital from £650,000 to £206,644 by writing down the 150,000 £1 ordinary shares to 1s. each, and by reducing the nominal amount of 497,860 £1 preference shares to 8s. each, the balance of £2,140 being provided by the cancellation of forfeited preference shares. The total capital will then stand at £206,644, in 497,860 preference and 150,000 ordinary shares. Further, the arrears of dividend on the preference shares, amounting to about £245,000, are to be cancelled, and their future dividends are to be non-cumulative. Compensation is offered the preference shareholders in an increase of their fixed rate of dividend from 7 per cent. to 10 per cent., and the right to one-half of any surplus profits after payment of this dividend. At present they are entitled to two-fifths of the surplus up to a further 7 per cent. after the ordinary have received 7 per cent.

AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder; i.e. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

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Published March 10, 1927

- 5,377. T. J. P. HANSOM. Devices for screening objects against visibility. (265,313.)
25,224. LORD INVERNHAIRN (W. BEARDMORE) and A. E. L. CHORLTON. Landing-gears. (265,650.)
29,632. J. DE LA CIERVA. Aircraft with rotative wings. (265,716.)
29,700. H. LEITNER and DR. H. C. WATTS. Air screws. (265,717.)

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Published March 10, 1927

916. P. M. HEYERDAHL. Helicopters. (265,754.)
2,993. DAIMLER MOTOREN GES. Aeroplanes with detachable planes. (246,875.)
7,639. N. A. McCULLY. Landing-apparatus. (265,804.)

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